



**PUT TO THE TEST
BIGGER C-SERIES
JOINS FLIGHT TO
CERTIFICATION**
NEWS FOCUS P14

BUILDING BOOM

A320 production rate
could soar as high as 60
a month after 2017, but
A330 faces slowdown **10**

FIXED ON F-35

Dutch pass point of no
return with replacement
of F-16 after parliament
commits to JSF order **21**

FLIGHT

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10-16 MARCH 2015

HELICOPTERS

DAWN OF A NEW 'H'

Re-designations all round as
Airbus unveils medium flagship



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COVER IMAGE

Airbus Helicopters provided this computer-generated rendering of its H160, in advance of unveiling the new medium-twin at the Heli-Expo show **P18**



BEHIND THE HEADLINES

Dan Parsons (left) and **Stephen Trimble** traded Washington DC, for **Orlando, Florida**, to cover the **Heli-Expo** show (P8, 16). Across the Atlantic, **Beth Stevenson** was in **Brussels**, attending the **AUVSI Unmanned Systems Europe** event (P9, 24)



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We look at what are likely to be the key themes for the UK's coming defence review, and BAE Systems' prospects

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Australia may not be the sole Super Hornet export customer for long **P20**. Bell rings in changes for 407GX **P17**

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IMAGE OF THE WEEK

Aerolineas Argentinas has received its first of four A330-200s being acquired directly from Airbus. Powered by GE CF6-engines, LV-FVH will initially serve routes to Miami and New York, then Madrid. Flightglobal's Ascend Fleets database says the flag carrier currently leases 11 A330s and A340s

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Airbus

THE WEEK IN NUMBERS

4.6%

IATA/Flightglobal dashboard

The January increase in global airline passenger traffic was good news – except that it lagged capacity growth of 5.2%

\$138m

Flightglobal dashboard

The debt burden that pushed airline Tigerair Mandala into bankruptcy exceeds its asset value – liquidation looms

40

European Space Agency

The number of pieces of space debris resulting from the 3 February explosion of a US military weather satellite

QUESTION OF THE WEEK

Last week, we asked: **Will Lockheed Martin hit its \$80 million F-35A price target by 2019?** You said:

53%

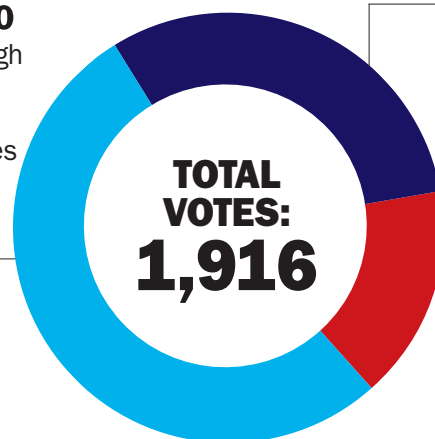
Not enough orders to achieve economies of scale

31%

No, but unit price will fall below \$100m

16%

Yes, development risk is low and orders are picking up



This week, we ask: **By 2019, how many Airbus and Boeing narrowbodies will be made monthly?** ☐ Fewer than 80 ☐ 80-100 ☐ 100-120 ☐ More than 120
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Revolutionary hero

It may not be the futuristic machine originally envisaged, but the Airbus Helicopters H160 shows how the manufacturer is re-inventing itself since shedding its old Eurocopter identity

As the curtain dropped behind Airbus Helicopters' beaming chief executive Guillaume Faury at the Heli-Expo show in Orlando, Florida, it revealed... well, what appears to be just another helicopter.

The H160 – as the long-running X4 programme is now known – is conceived as a direct response to the commercial success of AgustaWestland's AW139.

Original concept studies for the new rotorcraft showed it laden with next-generation technologies, such as fly-by-wire controls and a radical cockpit display. However, all these advances were notably absent from the H160 unveiled on 3 March.

Airbus Helicopters has taken a calculated gamble. It believes that by prioritising a smooth and speedy development – and therefore a higher level of maturity at service entry – over a basket of high-tech gadgetry, it will attract more customers. A 40% market share in the medium-twin segment is its target.

With the H160, the company is putting smooth development ahead of high-tech gadgetry

According to its world view, what operators want above all else is fuel efficiency, safety and reliability. In other words, a rotorcraft that works as intended from day one, rather than a technology demonstrator.

Of course, to dismiss the new H160 as just another helicopter is a little unfair. It features brand-new Turbomeca engines, a fully composite airframe, Blue Edge rotor blades, electric landing gear and so on.

In fact, nearly 70 patents have been taken out covering the H160. It is nothing if not sophisticated, but it is next-generation only in the eyes of its manufacturer.



Some innovations are best left to science fiction

However, what is almost more interesting than the helicopter itself is the approach that the company is now taking to research and development.

Under the leadership of Faury, the manufacturer is arguably closer in style and management to its Airbus colleagues in Toulouse than ever before.

That can be seen in both the way the H160 has been significantly repositioned to be “the AW139 killer” and the work going on behind the scenes to change the way all future products are developed and industrialised.

There also appears to be an air of hard-headed pragmatism at Airbus Helicopters these days, as opposed to the more freewheeling style evident previously.

So, although the H160 may lack significant wow factor – revolutionary only in its nature – there is plenty about it to suggest that it will sell strongly.

Programme managers are already drawing comparisons with the commercial A350. However, it remains to be seen whether the good folk of Marseille can emulate that platform's success. ■

See This Week P6, News Focus P18

The endless search?

A year after it disappeared, not a trace of the missing Malaysia Airlines flight MH370 has been found. Tantalising but vestigial satellite links with the aircraft have enabled Australian Transport Safety Bureau-led searchers to reach a consensus on where it is worth looking for the Boeing 777's remains – but that is all.

Australian Prime Minister Tony Abbott told parliament in Canberra on 5 March: “I do reassure the families of our hope and expectation that the ongoing search will succeed, [but] I cannot promise the search will go on at this intensity forever.” This followed a statement by deputy prime minister, Warren Truss, who said: “We clearly cannot keep searching forever.”

There are significant differences between the MH370

search and that for Air France flight 447, which went missing in the South Atlantic in 2009. AF447 was following its flightplan, and its oceanic position was known fairly accurately. Within 48h, floating wreckage had been sighted, but it still took two years to find the main wreckage. MH370, on the other hand, turned dramatically away from its planned route, and the search area is not defined by certainties.

As Flightglobal reported within a week of its disappearance from Malaysian military radar over the Andaman Sea: “If the aircraft went north it will be found one day. If it went south there's no guarantee it will ever be found in the vastness of the southern Indian Ocean.” ■

See This Week P8



For more information about the H160 and additional coverage from Heli-Expo, go online at flightglobal.com/helicopters



BRIEFING

QATAR CHALLENGES LUFTHANSA WITH SECOND A350 DELIVERY

DELIVERY Qatar Airways took receipt of its second Airbus A350 on 5 March, and will use the aircraft to operate Doha-Frankfurt flights. Speaking at the ITB travel trade show in Berlin, the Gulf carrier's chief executive Akbar Al Baker said the aircraft will be deployed on this route to "rub salt in the wound" of Lufthansa. Al Baker also praised the type's performance during its first two months of revenue service, saying dispatch reliability has been "over and above" Qatar's expectations. A third A350 will be deployed to Singapore from June.

DORNIER 228NG PITCHED TO OMANI USERS

DEMONSTRATION RUAG Aviation and its local partner Aflag have conducted demonstration flights with a Dornier 228NG for potential customers in Oman. The 19-seat type is being offered to the nation's air force, police service and tourism sector for roles including pilot training, utility transport and surveillance, and to potentially support hub-and-spoke commercial operations from Muscat and Salalah.

UNDISCLOSED CUSTOMER COMMITS TO 23 A320S

ORDER Airbus secured an order for 23 A320-family aircraft from an undisclosed customer during February, taking gross orders to 37 aircraft in the first two months of 2015. The order on 27 February comprises 18 of the re-engined A320neo and five regular A320s, according to the airframer's latest backlog data. Airbus also recorded the conversion of another nine ordered A320s into A320neos by budget carrier AirAsia, taking the net order figure to 28.

ITP TO PARTNER ON FUTURE ROLLS-ROYCE ENGINES

PROPULSION Rolls-Royce's Spanish joint venture Industria de Turbo Propulsores is to provide turbines for future large civil engines under a revised partnership agreement. R-R owns nearly 47% of ITP and engineering firm Sener the balance. The venture is a risk- and revenue-sharing partner on Trent engine programmes.

SENER PROMOTES UNARMED PREDATOR B

PARTNERSHIP General Atomics Aeronautical Systems has teamed up with Spain's Sener to offer its Predator B to the nation's defence ministry. Under the pact, the partners will offer an unarmed version of the medium-altitude, long-endurance unmanned air vehicle, with Sener "to optimise and synergise data collection".

UK NARROWS SPACEPORT SHORTLIST

SPACEFLIGHT The UK Civil Aviation Authority has moved the nation a step closer to hosting suborbital tourism and the launch of small satellites by narrowing its shortlist of spaceport sites – to operate as early as 2018 – to Campbeltown, Llanbedr, Newquay, Prestwick and Stornoway. Criteria include an existing or potential 3,000m runway, ability to segregate airspace and a remote location.

NALJETS ADDS UK'S FIRST CHALLENGER 350

ARRIVAL Business aircraft charter and management company Naljets has taken delivery of the first UK-registered Bombardier Challenger 350. The aircraft joins a Gulfstream G200 and a large-cabin Challenger 605 in service with the Newcastle-based operator.

ETIHAD TO FLY A380 TO NEW YORK

ROUTES Etihad Airways is adding New York JFK to its growing list of Airbus A380 destinations. The carrier will deploy the A380 on one of its existing twice-daily Abu Dhabi-JFK services from 1 December.



Stephen Trimble / Flightglobal

The first new product for Airbus Helicopters emerged at Heli-Expo

COVER STORY DOMINIC PERRY MARIGNANE

H160 sheds cloak to reveal revisions

While some innovations from X4 concept have been left out, manufacturer highlights advances for medium-twin

Airbus Helicopters has unveiled its first new product since being formed at the start of last year, with the covers having come off its H160 at the HAI Heli-Expo show in Orlando, Florida on 3 March.

The H160, says marketing manager Aurélie Gensolen, is the first of the manufacturer's "H generation". It may lack the high-tech gadgetry and distinctive look of Eurocopter's original X4 concept studies, but Gensolen insists that the airframer has not shied away from using cutting-edge technologies, where appropriate.

"All these innovations are not for the sake of innovation itself, but to provide added value to the customer," she says.

For instance, the aircraft's Fenestron – canted by 12° – is both quieter than a normal tail rotor and provides lift equivalent to 40kg (88lb) of additional payload. The biplane stabiliser improves handling and performance, particularly at low speed, where another payload gain equivalent to 40kg is seen.

Similarly, electrically actuated landing gear and brakes cut weight and increase simplicity over their hydraulic equivalents.

Improvements have been made under the skin too. The all-new gearbox features two completely independent lubrication circuits.

One is the primary system and the second, which sits inside the 'box, effectively acts as the back-up.

"It is a strong improvement to what we have done in the past," says Charles Louis, team leader for dynamic systems.

As there is no emergency lubrication system, if there is a problem with the primary circuit the helicopter can continue to fly. Test runs have shown the gearbox is able to run for at least 5h using the back-up circuit "without any damage". Run-dry tests have also taken place in excess of the 30min certification requirement, Louis says.

Airbus Helicopters hopes to take the "lion's share" of the medium segment as it looks for a return to its heyday, when the AS365 Dauphin commanded a market share of around 40%.

Meanwhile, no decision has been taken on the future of the AS365 or H155 models that the H160 will supplant. In all, a combined 28 examples were delivered last year, with the majority being military-variant AS565 Panthers.

"Even if this family is a long-lasting one it is also still a very active one," says chief executive Guillaume Faury. Although a militarised variant of the H160 is envisaged, he says, it is yet to be officially launched. ■

See Show Report P16, News Focus P18



Enhanced flight tracking set for trials
THIS WEEK P8

ROTORCRAFT DOMINIC PERRY LONDON

Sea Lion deal confirmed as Berlin slims helicopter fleet

Navy to get 18 maritime-variant rotorcraft, but army hit by cuts to its NH90 and Tiger orders

Germany has at last finalised a deal that will see it order 18 new NH Industries (NHI) NH90 NFH helicopters for its navy, while at the same time trimming commitments for the troop transport variant and Airbus Helicopters Tiger.

The deal for the naval NH90 – which will be known as the Sea Lion in German service – is worth around €1.4 billion (\$1.55 billion). However, the nation's army will now receive 80 instead of an originally planned 122 NH90s, with two further airframes for training and 22 more covered by options. The latter service's order for the Tiger is also reduced to a total of 68 attack helicopters. However, 11 of its early-build examples will be immediately retired from service, with the target being for a future frontline fleet of just 40.

"The helicopter framework agreement is an acceptable solution for both the German [Ministry of Defence] and Airbus Helicopters. It enables the German MoD to fulfil the targets of the structural reform and it means planning security for us," says Wolfgang Schoder, chief executive of Airbus Helicopters Germany.



Reductions to the tactical transport purchase will limit buy to 80

"With the order of 18 NH90 Sea Lion, the Bundeswehr will get a helicopter which is successfully in operation in five NATO nations [and] which has shown its outstanding performance in multinational missions. I am sure that it will fulfil the operational requirements of the German naval forces," Schoder says.

"Furthermore, the German helicopter industry can continue its key competences in developing, producing, supporting and upgrading maritime helicopters."

Deliveries of the Sea Lion model are due to commence in 2018, as the German navy retires its fleet of Westland Sea King 41s.

According to a *Reuters* report, assent for the new deal comes with a number of conditions. This includes penalties – up to potential cancellation – if delivery and performance targets are not met.

Germany's armed forces safety committee last month approved a gradual resumption of flights for the army's troop transport variant of the NH90, after the type had been grounded after an investigation into an engine fire and electrical system failure in Termez, Uzbekistan, last June. Crews will follow new procedures, including venting the engines before every start, while NHI works on a long-term design change. ■

RESULTS

Embraer targets delivery growth as earnings dip

Brazilian manufacturer Embraer is expecting to deliver between 95 and 100 commercial aircraft this year, and to achieve overall revenues in the range of \$6.1-6.6 billion.

The company on 4 March announced an increase in full-year revenues during 2014 to almost \$6.3 billion.

It delivered 92 commercial and 116 executive aircraft last year, in line with its previous guidance figures.

However, a higher mix of Embraer 175 regional jets in its delivery portfolio, along with lower-than-expected deliveries in its large executive jet sector, meant that the company's earnings before interest and taxes (EBIT) of \$543 million – down by 24% on the previous year – was below its guidance margin.

Embraer delivered 30 commercial aircraft in the fourth quarter of 2014.

Its revenues for the final three-month period declined by 11% to \$2 billion, while EBIT more than halved to \$196 million.

The company's backlog at the end of last year stood at nearly \$21 billion; up by 15%. ■



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INCIDENT DAVID KAMINSKI-MORROW LONDON

Drama in Nepal as Turkish A330 slides off runway

One passenger received hospital treatment after a Turkish Airlines Airbus A330-300 "slid off the runway" after landing at Kathmandu Tribhuvan airport in Nepal on 4 March.

The Turkish flag carrier indicates that a number of minor injuries were reported from among the 224 passengers and 11 crew on board flight TK726 from Istanbul, who evacuated using the aircraft's slides.

Images from the scene show aircraft TC-JOC as having come to

rest on rough ground, with its nose-gear collapsed, and damage sustained by both General Electric CF6 engines. Flightglobal's

Ascend Fleets database records the aircraft as owned outright by Turkish Airlines and as having been delivered in May 2014.



A nose-gear collapse resulted in damage to both CF6 engines

"Necessary precautions have been taken for towing the aircraft out of its current place and the relevant work on that issue has started," says Turkish Airlines.

"The technical examination will determine the cause of the incident," it adds.

There is only limited data available on weather conditions at the accident time of 07:47, but images of the evacuation posted to social media sites shortly after the event indicate the presence of fog. ■

PRODUCTION DAN PARSONS ORLANDO

Sikorsky pulls the plug on Schweizer helicopter line

Sikorsky has axed production of the S434 light single helicopter, and divesting two other production lines is also under consideration, company officials say.

The S434, S300 piston-powered single and turbine-engined S333 production lines were acquired when Sikorsky bought Schweizer Aircraft in 2004. Partly because of low orders, absorbing the company has been costly, says Dan Hunter, director of commercial programmes.

"We had a lot to do to make that product line what we wanted it to be as part of the Sikorsky family – either to retain it or to make a good offer to someone who might want to be in that business," he said at the HAI Heli-Expo show in Orlando, Florida on 4 March.



The S300 has not sold well and further orders will not be taken

The S434 line was officially closed after Saudi Arabia's defence ministry bought and then returned several of the four-bladed turboshaft helicopters because they were wearing out before the end of their estimated service lives, Hunter says.

Sikorsky liquidated Schweizer and wholly absorbed its product line in 2012. Despite the cost incurred during the transition, and the S300's uncertain future, Hunter says the acquisition was a sound business decision and that aircraft continue to be delivered.

However, the manufacturer will not take new orders for either the S300 or S333, and has already outsourced final assembly to long-time supplier Summit Aviation.

"We have not made a decision on either of those variants," Hunter says. "We think there is probably a place somewhere where that would be a viable product line. It will be a little while before we decide where that lands and lives."

Sikorsky still has 19 S300s on contract, and is delivering 11 S333s to the Royal Saudi Land Forces. The company also has commitments for aftermarket service for the 2,800 light rotorcraft in its installed base, with post-production services and maintenance having been valued at \$10 million in 2014. ■

See Show Report P16

SAFETY DAVID KAMINSKI-MORROW & DAVID LEARMOUNT LONDON

Enhanced flight tracking set for trials

Airservices Australia to work with Inmarsat to implement ADS-C surveillance technology following MH370's disappearance

Air navigation service provider Airservices Australia is to test enhanced flight-tracking on oceanic services, following an ICAO agreement on 6 February to back a 15min surveillance interval.

The tests will be conducted in co-operation with Malaysia and Indonesia, as well as satellite communications specialist Inmarsat. Qantas and Virgin Australia will be among the carriers supporting the trial flights, which will be based on automatic dependent surveillance-contract (ADS-C) technology.

ADS-C is a concept under which a flight agrees the automatic relay of position data, and other information, to an air traffic control service at regular intervals. The technology has been available for several years, but received greater attention following the disappearance of Malaysia Airlines flight MH370 on 8 March 2014.

Australian deputy prime minister Warren Truss says that the

"truly regional initiative" will shorten the tracking interval to 15min, compared with a previous spacing of 30-40min, and provide real-time tracking in the event of an abnormal development.

Air France flight AF447 had unsuccessfully attempted to establish ADS-C communication with Senegalese oceanic air traffic control before contact was lost with the Airbus A330 over the southern Atlantic in June 2009.

Inmarsat – which was instrumental in relocating the search for the missing Malaysia Airlines Boeing 777-200ER to the Indian Ocean off western Australia – says 11,000 passenger aircraft are already equipped with its satellite connection, representing over 90% of the world's long-haul commercial fleet.

The company has proposed a basic flight-tracking service to airlines, with its solution centred on

free position reporting every 15min. The Australian trial aims to test the ICAO standard using its ADS-C messaging capability.

Inmarsat chief Rupert Pearce claims the test is an "important step in improving international airline safety" and that the company is "well-placed" to assist with implementing the ICAO standard. Performance data from the tests will be used to assist the development of further measures and techniques to provide comprehensive tracking.

As the first anniversary of MH370's disappearance passes, there has still been no trace of the aircraft found, although the Australian Transport Safety Bureau continues to lead a seabed search in the southern Indian Ocean. The agency is trying to reach agreement with Malaysian and Chinese search partners on how long the activity should continue, before being abandoned in the event that no wreckage is located. ■



Qantas will take part in the tests of the position-reporting system



**Airbus picks up
pace on A320
output**
AIR TRANSPORT P10

THIS WEEK

LOGISTICS BETH STEVENSON BRUSSELS

EasyJet: send spares by UAV

Unmanned aircraft have potential to fly parts around Europe, says airline's engineering chief

Low-cost carrier EasyJet is looking at the potential of using unmanned air vehicles to reduce the logistics burden in quickly supplying spare parts to grounded aircraft.

The airline – which currently transports spares primarily by road – believes that a vertical take-off and landing UAV could speed up the process, and help to ensure that its aircraft are back flying as soon as possible.

Compensation the carrier has to pay to customers if flight delays exceed 3h, as mandated by the EU, makes the speed of delivery of parts and the assessment of aircraft very appealing, EasyJet head of engineering Ian Davies told the AUVSI Unmanned Systems Europe conference in Brussels.

“We need to be able to transport things using a 200kg [440lb] payload,” says Davies, who notes that UAVs are traceable and also can fly encrypted missions. As spares warehouses are typically situated near airports, it would be a simple “A to B” flight, he adds.

A light-aircraft-sized tiltrotor with a larger payload could also



Quicker delivery would mean A319s spend less time on the ground

be employed to carry out hub-to-hub flights across country or even to neighbouring countries, providing “instant availability for moving parts”.

Although Davies says a 200kg payload would be ideal, aircraft with a 50kg cargo capacity could be more readily available and a shorter-term option.

Progress is needed from European regulators to develop the general principles for UAV flights

in non-segregated airspace to allow cross-channel operations.

The Luton-based airline is also exploring the use of UAVs to assess its Airbus A319s and A320s for damage, requiring the use of ultra-high-definition video and laser payloads. It has already tested a single-laser system, but hopes to ramp this up to an eight-laser version that could measure aircraft surfaces down to three microns. ■

See News Focus P24

PROJECT TOM ZAITSEV MOSCOW

Russian funding in doubt for joint China widebody

Development of a proposed Russian-Chinese widebody airliner may face financial constraints, as Russian authorities have mooted withholding federal funds from the project.

In November 2014, the government tentatively decided to allocate around Rb1.5 billion (\$24 million) to support conceptual design work on the aircraft in 2015. This was to have complemented a further Rb2.5 billion from non-budgetary sources.

But the trade and industry ministry now believes state funds earmarked for the widebody project should be held back this year.

“Taking account of the cuts in annual budgetary obligations made by the treasury, we deem it necessary to forgo disbursing these monies in 2015,” says the ministry in correspondence to the government about a federal programme for the development of civil aviation.

While a final decision is still to be made, United Aircraft has undertaken to refine the project's funding requirements. “We have set about optimising them,” says chief Yuri Slusar. ■



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MANUFACTURING DAVID KAMINSKI-MORROW LONDON

Airbus picks up pace on A320 output

Production rate set to increase to 50 a month and could be raised to over 60 after 2017 as backlogs continue to surge

Airbus is to hike the monthly production rate for its A320 family to 50 from the first quarter of 2017, and is studying monthly production rates in excess of 60 aircraft, in response to the growing backlog for the type.

However, it will also cut the rate of the A330, in the first quarter of next year, from nine to just six aircraft.

Airbus has been examining a possible rate increase on the A320 as the backlog for the A320neo has surged.

At the end of January the airframer had just under 5,100 aircraft in the backlog of the A320 and A320neo families.

It has already committed to raising the rate to 46 in 2016.

But the airframer had disclosed, at the beginning of this year, that it was nearing a decision on a possible further rise.

The A320neo – a re-engined version of the current A320 – is due to enter service in the fourth quarter of this year.



Airbus's backlog for the A320 and A320neo families was at just under 5,100 at the end of January

Airbus's other re-engined aircraft, the A330neo, is due to enter service in 2017. The airframer has been trying to close a gap in A330 production slots during the transition to the A330neo.

But while it had already opted to slow monthly production from

10 to nine aircraft in the fourth quarter of this year, Airbus had indicated that it might have to impose a further cut.

On the mooted A320 rate increase, chief executive Tom Enders, speaking during a results presentation in Munich on 27

February, said that the company only changes its rates after "intensive dialogue" with suppliers regarding potential obstacles and bottlenecks.

But he says that Airbus has "studies under way" – stressing that they are only studies – to increase the rate to "60-plus".

While the airframer's single-aisle rates are rising they will not affect deliveries this year.

Airbus has said that 2014 had been a "remarkable" year overall for the manufacturer.

Commercial aircraft earnings increased by 68% to €2.6 billion (\$2.9 billion) as revenues rose by 7% to €42 billion.

Meanwhile, Enders insists that its A380 will achieve production break-even this year.

While this does not mean that the programme has recouped its development investment, it signals that individual aircraft will no longer be built and delivered at a loss.

The company delivered 30 A380s last year and had a backlog of 164 of the type at the end of January this year.

Airbus has long been forecasting that it would break even at production level on the A380 this year. ■

See News Focus P25

TECHNOLOGY STEPHEN TRIMBLE WASHINGTON DC

Enders envisages 3h flights to Sydney on Concorde successor

Airbus Group will one day deliver a supersonic aircraft that can connect Paris and Sydney within 3h, chief executive Tom Enders has told a French newspaper.

The interview with Enders in *Le Journal du Dimanche* provides no firm details, but extends the company's public interest in supersonic technology beyond business aviation and military aircraft.

In the interview, Enders is challenged about whether Airbus has the appetite for revolutionary projects such as the Aerospatiale-BAC Concorde, which was co-developed by Airbus's predecessor.

Enders notes that Airbus has developed an electric-powered aircraft, the E-Fan, and adds: "We also have

a team working on the devices at high and very high speed.

"The group has a tradition since Concorde and there is a real demand for high speed. One day we will connect Paris and Sydney in three hours."

In addition to participating in production of the Eurofighter Typhoon, Airbus's Defence & Space division last September agreed to collaborate with Aerion in the development of the latter's AS2, a three-engined supersonic business jet scheduled for first flight in 2019.

Airbus Group, while under its former brand EADS, promoted a near-hypersonic concept, designated ZEHST, during the 2011 Paris air show. The Mach 4 concept aircraft was not a formal project but part of a study on future technology, and intended to illustrate EADS's potential capabilities. ■



Concorde was co-developed by Airbus's predecessor Aerospatiale



Interjet adds to Superjet set
AIR TRANSPORT P13

CABIN EDWARD RUSSELL NEW YORK

Swiss to bed-in latest semi-private first class suites on its 777-300ERs

Swiss International Air Lines will install first class suites on its Boeing 777-300ERs, the first of the Lufthansa Group carriers to offer the premium product.

The aircraft will be configured with the suites, as well as business class and economy class seats, when deliveries begin in 2016, says Patrick Heymann, senior director and head of Americas for the Zurich-based Star Alliance carrier.

The first class product will not be entirely private, like similar offerings on Emirates and Singapore Airlines, but will have partitions that make each seat a semi-private suite, he says.



The first class product has partitions to create semi-private suites

Swiss will configure its 777s with seats for roughly 100 more passengers – about 330 seats – than on its existing widebody aircraft, he says.

It operates 13 Airbus A330-300s with 236 seats and 15 A340-

300s with 219 seats. The airline will take four 777-300ERs in 2016, with the first aircraft due that January, and two in 2017, Flightglobal's Ascend Fleets database shows. The aircraft were ordered in 2013. ■

DEVELOPMENT MAVIS TOH SINGAPORE

C919 takes shape as Comac fixes 2015 first flight target

Pictures released show nearly complete airframe although no systems are yet installed

Final assembly work on the Comac C919 has kicked into high gear, with assembly of the first prototype airframe approaching completion.

Pictures released to Flightglobal show an almost complete airframe joined from nose through to the tail. Wing-to-body join has also been done, with the vertical

and horizontal stabilisers already attached to the aircraft's tail.

The aircraft is still resting on struts, although the main landing gear and forward landing gear appear to have been installed. The aircraft's wingtip devices have also yet to be installed. No other aircraft are pictured in the final assembly centre area.

Comac says no systems have yet been installed on the aircraft.

Over the last six months the Chinese aircraft manufacturer has been taking delivery of the jet's major structures, with final assembly work officially started last September.

Comac has publicly confirmed the end of 2015 as the aircraft's first flight target.

The manufacturer adds, however, that major works such as the installation of the avionics, flight control and hydraulics systems remain to be done. The various systems also have to be integrated and tested.

Tests are, however, ongoing at full swing on the C919 iron bird test rig, with more than 50 test engineers and technicians involved, the company adds.

Comac has so far secured 450 commitments for the in-development narrowbody from 18 companies, most of which are local airlines and leasing firms. ■



The aircraft is on struts but landing gear looks to have been fitted

PROGRAMME

Udvar-Hazy bets on fresh 757 successor

Air Lease Corp chief executive Steven Udvar-Hazy believes Boeing is leaning towards a brand-new Boeing 757 replacement with additional capabilities rather than a re-engined version of the type.

"We're very, very intimately involved with Boeing... and based on everything we've seen, I think the re-engining idea is not on the table at this time," said the ALC head during an earnings call. "I think Boeing is looking at an airplane that is not only a 757 replacement but one that also could do things beyond that capability in terms of range and size, because this aircraft will be around for 35 or 40 years."

He adds: "I think the focus is on an airplane that can replace the 757 as well as do other things even above that size."

In January, ALC became a launch customer for the long-range version of the Airbus A321neo with a 97t maximum take-off weight. First deliveries are planned for 2019.

However, Udvar-Hazy does not see the new long-range Airbus as a surrogate for the 757.

"I would not characterise the A321LR as a true 100% 757 replacement, but it does accommodate a significant portion of the 757 flying done by US and foreign carriers," he says.

"In Europe, we have a number of carriers that operate these aircraft from northern Europe, the UK, Scandinavia, northern Germany, down into places like the Canary Islands, to Mediterranean resorts, Egypt – places where the A321, with additional range, gives these airlines a lot more payload/range flexibility. Many are now flown with 757s that are getting pretty old."

He also points to flights to South America from North America, particularly Dallas, Houston, Miami and Orlando. "The current A320s and A321s, on some of those sectors, are a little bit marginal in terms of being able to carry full payloads," says Udvar-Hazy. ■

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**CS300 first flight
lifts Bombardier
hopes for C-Series
NEWS FOCUS P14**

REGIONAL AIRCRAFT DAVID KAMINSKI-MORROW LONDON

Interjet adds to Superjet set

Mexican carrier firms 10 more orders but Belgian and Russian airlines deliver new setbacks

Interjet has firmed orders for 10 Sukhoi Superjet 100s, bringing the Mexican carrier's total to 30 of the Russian-built type.

However, in a mixed week for the programme, Belgian carrier VLM Airlines – the first Western European operator of the aircraft – said it is delaying its planned introduction of Superjets by more than a year because of a certification hold-up affecting the type's long-range variant.

Meanwhile, Russian carrier Red Wings is looking to obtain state financial backing after starting Superjet operations earlier this month.

SuperJet International, the marketing venture for the jet outside the former Soviet Union and Asia, originally signed a contract in 2011 with Interjet for 15 Superjets, before firming five options.

SuperJet International partner Finmeccanica says that these 20 aircraft will all be delivered before the end of this year, and that the additional 10 will arrive by the end of 2016.

Superjet 100s are all fitted with PowerJet SaM146 engines.

Interjet operates 12 of the 93-seat type which, says Finmeccanica, have collectively accumulated more than 20,000h in service.

Antwerp-based VLM in October 2014 signed a tentative lease deal with Ilyushin Finance covering two Superjet 100LRs (as well as two options and 10 purchase rights), with the first aircraft scheduled for delivery in April 2015.



Red Wings is seeking state support for its Superjet 100 operations

That target has been moved to the third quarter of 2016 to enable EASA certification of "features" on the aircraft's LR variant, says the wet-lease and scheduled operator.

These include certain flap settings, for take-off and landing, intended to deliver "significant performance enhancements".

The Superjet's short take-off and landing capability was a central reason for the aircraft's selection by VLM, chief executive Arthur White told Flightglobal in November.

Antwerp has a 1,500m (5,000ft) runway, and the airline operates to London City, at which aircraft can only operate if the manufacturer has gained a special steep-approach approval.

White also wants to deploy the aircraft to destinations with small airports that cannot be served by Airbus A320s and Boeing 737s, in order to differentiate VLM from budget airlines.

VLM specialises in wet-lease flying but started scheduled

flights earlier this year. It operates a Fokker 50 turboprop fleet.

Red Wings put into revenue service two used Superjets formerly operated by now-defunct Moskavia on 6 February.

It expects to take delivery of a third Superjet in March, says general manager Yevgeny Klyucharev.

Under a lease agreement signed with Sukhoi in October 2014, the carrier also holds seven options on the type.

However, Klyucharev says it wants first to secure Rb1.5 billion (\$24 million) in state guarantees valid during the aircraft induction period.

"This would be needed to cover the costs of working out possible technical kinks," he says, indicating that Red Wings has already spent Rb40 million on preparations to accept three Superjets.

He adds: "If we fail to obtain such a backing from the state, we'll have to look for other solutions."

Additional reporting by Michael Gubisch in London and Tom Zaitsev in Moscow

OPENING

Héroux-Devtek geared-up after landing 777X

Canadian manufacturer Héroux-Devtek has inaugurated a factory in Ontario to build main and front landing gear for the Boeing 777 and 777X.

The Montreal-based firm scored a major coup in 2013 when it won the exclusive contract from 777 incumbent United Technologies. Until now, Héroux-Devtek has mainly supplied landing gear for regional, business and military aircraft or, as a second-tier player, landing-gear components for Messier-Bugatti-Dowty and UTC.

Production at the 10,000m² (108,000ft²) site in Cambridge will begin in June, and Héroux-Devtek will take over the contract fully from UTC in January 2017. The contract involves designing and building new landing gear for the latest version of the large widebody.

Describing the deal as "the most important landing-gear contract in Héroux-Devtek's history" at a ceremony on 26 February, chief executive Gilles Labbe said the company had acquired enough land to double the size of the facility if it wins more work from Boeing or other airframers.

Labbe said the company had considered sites in Mexico, the USA and elsewhere in Canada before settling on Cambridge, a town 80km west of Toronto and near another Héroux-Devtek site in Kitchener.



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TESTING STEPHEN TRIMBLE WASHINGTON DC MURDO MORRISON MIRABEL

CS300 first flight lifts Bombardier hopes for CSeries

Arcamone says both variants in test campaign gives impetus to narrowbody's prospects of winning new airline customers

Bombardier believes that having its two CSeries variants in flight testing will give a confidence boost to the type's sluggish sales campaign, as the manufacturer strives to achieve 300 orders by the CS100's planned entry into service in the second half of the year.

On 27 February, the Canadian manufacturer launched the flight test campaign of the stretched, 135-seat CS300 with a 4h 57min sortie from the company's final assembly centre in Mirabel, Canada. The flight test begins a nine-to-15-month certification programme for the larger variant of the narrowbody pairing.

The 110-seat CS100 is currently scheduled to achieve entry into service in the second half of 2015, having begun flight testing nearly 18 months ago. Although

the CS100 is now running two years behind schedule, Bombardier has never altered its plan to deliver the first operational CS300 six months after handing over the first example of the smaller variant.

SUCCESS

Accounting for almost three-quarters of all 243 firm orders that have been booked so far, the commercial success of the CS300 may hold the keys to the future of the programme.

"The CS300 is the major player," says Mike Arcamone, president of Bombardier Commercial Aircraft. "This [first flight] is a very important milestone. It takes us into the last lap."

He adds: "This will stimulate more campaigns. We have attention from start-ups in Indonesia,



Africa and Europe, but our major focus is getting it certificated."

Following the CS300 maiden flight, there was confusion after a Swiss International Air Lines executive appeared to confirm that it will be the first operator of the CS100. In December, Bombardier disclosed that it had reached an agreement with an unnamed airline to launch the aircraft in service, after Malmo Aviation withdrew from that role in September. However, parent Lufthansa later said that Swiss had not agreed to be launch operator.

Lufthansa Group placed the first order for the CS100 in 2008, assigning the aircraft to subsidiary Swiss, but had previously declined to be the launch operator. Swiss has a firm order for 30 CS100s, Flightglobal's Ascend Fleets database shows.

However, when the Zurich-based carrier will take delivery of its first CS100 is unclear.

There was also a blow to Bombardier's sales hopes when Qatar Airways – long mooted as a possible blue-chip customer – sug-

gested it would not be ordering the CSeries, because of delays to the programme.

"We have completely forgotten about it because you cannot wait indefinitely," chief executive Akbar Al Baker said on the sidelines of the ITB travel fair in Berlin on 4 March.

"The CS300 is the major player. This very important milestone [first flight] takes us into the last lap"

MIKE ARCAMONE

President, Bombardier Commercial Aircraft

Bombardier plans to take the CSeries to Paris this June for its first appearance at an air show, although it does not specify which model or whether both will be there. "At Paris we will demonstrate how serious we are about the programme," says Arcamone. "We will update the programme to all our customers."

CSERIES ORDERS

CS100	Order
Swiss	30
Odyssey Airlines	10
Gulf Air	10
PrivatAir	5
Malmo Aviation	5
Lease Corporation International	3
Total	63
CS300	Order
Republic Airways Holdings	40
Macquarie Air Finance	40
Ilyushin Finance Company	22
Lease Corporation International	17
SaudiGulf Airlines	16
airBaltic	13
Korean Air	10
Iraqi Airways	5
UTAir Ukraine	5
VIM Airlines	5
Malmo Aviation	5
Falcon Aviation Services	2
Total	180

SOURCE: Flightglobal's Ascend Fleets database



Bristow takes a tilt at civil AW609
SHOW REPORT P16



The CS300's flight testing began on 27 February with a 4h 57min sortie from Mirabel

Andy Cline

As of late last week, the CS300 had completed 12h of flight testing, and the CS100 1,089h. Bombardier is aiming to achieve 2,400h of flight testing across both variants before certification.

PROGRESS

There are now four CS100s in the flight test programme, with a fifth joining this month. This will be the first example to fly with a full cabin and will be used to check features such as doors, luggage bay, waste drainage and interior lighting.

A second CS300, currently in final assembly, will also fly with a full interior.

The CS300 enters flight testing with the benefit of 18 months of painful lessons learned on the CS100 programme.

The smaller variant has dealt with multiple setbacks stemming from software delays and an engine malfunction that grounded the fleet for five months.

An oil system component inside the Pratt & Whitney PurePower PW1500G turbofan failed

during a 29 May ground test, causing pieces of the low-pressure turbine to disintegrate and damage the wing and fuselage of the first test vehicle FTV-1. Flights resumed four months later with a minor redesign of the oil system.

Several more weeks passed before Bombardier resolved the second major issue for the CS100. Until early October last year, the four aircraft had not activated the envelope protections enabled by the fly-by-wire system, due to the late delivery of the flight-critical software.

The CS300 stands to benefit from a functioning fly-by-wire system with envelope protections and a redesigned engine. Other than the slightly longer fuselage, the CS300 shares the same Rockwell Collins avionics augmented by Parker Aerospace fly-by-wire controls, P&W engines and aluminium-lithium panel fuselage structure of the CS100.

Those three components account for Bombardier's claimed 15% operating cost advantage of

the CS300 versus the type's nearest competitors, which include the Airbus A319neo and the Boeing 737 Max 7.

In addition to the six flight test examples, Bombardier now has three CS100s and one CS300 in assembly and expects to build around 120 aircraft a year once its production line at Mirabel is at capacity.

"We have completely forgotten about [the CSeries] because you cannot wait indefinitely"

AKBAR AL BAKER

Chief executive, Qatar Airways

Bombardier remains "bullish" about the prospects for the CSeries, says Arcamone, despite the narrowing gap between its entry into service and that of the rival Airbus A320neo. "The aircraft speaks for itself," he says. "It is the only new product in this market segment and we are beat-

ing our promises to our customers in terms of performance."

He adds: "We got one of our biggest orders from Macquarie [Air Finance for 40 CS300s] after all the engine problems."

RESTRUCTURE

Three weeks ago, Bombardier announced that Alain Bellemare would be replacing Pierre Beaudoin as chief executive of Bombardier, with Beaudoin moving to replace his long-serving father, Laurent, as company chairman. The change came as analysts warned of a cash crisis caused partly by the mounting costs of CSeries development.

Bombardier has made a number of small divestments in recent months, but may look to make more significant offloads – possibly including the Wichita-based Learjet business – to raise more cash. It has two business jet programmes, the Global 7000 and 8000, in development, although a third, the Learjet 85, has been put on ice. ■

Additional reporting by Ghim-Lay Yeo in Washington DC



Andy Cline

Bombardier expects to build 120 CSeries aircraft a year at Mirabel

HELI-EXPO 2015



Airbus Helicopters finally lifted the veil on its long-awaited X4 programme – now renamed the H160 – in balmy Florida, but that was far from the only surprise at the HAI Heli-Expo show in Orlando. AgustaWestland gained an endorsement for the AW609 civil tiltrotor from one of the world's largest helicopter operators and upgraded its AW139 to tackle a new competitive threat and Bell Helicopter scored a blockbuster deal for a new light-single. Dan Parsons and Stephen Trimble report

PRODUCTION

MD902 set for in-house redesign to boost sales

MD Helicopters has announced plans to redesign the MD902 Explorer light-twin utility helicopter with new parts developed in-house, as part of a campaign to improve sales by making it more affordable.

The new design – provisionally named the MD969 – should be completed by the end of this year, with certification in 2017 and first deliveries in 2018, says Lynn Tilton, chief executive of Patriarch Partners, the private equity firm that owns MD Helicopters.

If that timetable holds, the MD969 will appear 26 years after the debut of the original MD902 designed by McDonnell Douglas. Following a merger in 1997, the new ownership at Boeing showed little interest in commercial sales of the MD902, Tilton says. She acquired the company from a Dutch entrepreneur in late 2005 that had struggled to support the fleet.

"The supply chain, which feels burnt by the absence of robust sales, have made it way too

expensive for us – and that hurts our customers," Tilton says.

This is not unlike the situation with MD Helicopters' line-up of single-engined, 500-series helicopters that Tilton inherited in 2005. She pursued a similar strategy of bringing parts production in-house and developing new versions of the aircraft.

MD Helicopters now builds the armed MD530F and MD530G. It is also developing the heavier-weight MD540A, but the company has a problem with the prospective engine supplier, Rolls-Royce, Tilton says.

R-R is expected to deliver the upgraded Model 250-C47E engine to support the certification phase, but there have been delays, she says.

"We have somehow fallen behind on their top customer list," says Tilton. "To get my certification done on these upgraded aircraft I must get an engine in my hand because I don't want to certify with any other engine." ■

DEVELOPMENT

Bristow takes a tilt at civil AW609

AgustaWestland wins support of oil and gas sector group to help optimise the configuration of its high-speed tiltrotor

Oil and gas support services operator Bristow Group has agreed to start working with AgustaWestland to optimise the AW609 for commercial operations, as it endorses the capabilities of the first civil tiltrotor to enter certification testing.

AgustaWestland displayed an AW609 emblazoned with the liveries of Bristow and its UK-based regional airline Eastern Airways in the exhibit hall. In the long history of developing civil tiltrotor technology, it is the most visible sign yet that a new era of rotorcraft technology is dawning.

Jonathan Baliff, president and chief executive of Bristow, believes there are "tremendous opportunities" for using the \$24 million tiltrotor with 275kt (509km/h) speed and the ability to land vertically.

In addition to its traditional rotorcraft operations, Bristow is expanding into the fixed-wing world through the acquisitions of regional airlines in Australia and the UK – Airnorth and Eastern Airways – that are dedicated to shuttling work crews to smaller airports. Such personnel frequently require onward transportation by helicopter.

With an aircraft such as the AW609, Bristow now sees an opportunity to offer a complete logistics service with one aircraft type, Baliff says.

Though launched 18 years ago, the AW609 still remains two years away from achieving civil certification with the US Federal Aviation Administration.

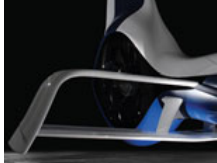
As the fly-by-wire aircraft continues certification testing, Bristow will work with AgustaWestland to refine the configuration, maintenance requirements and operational tasks. Bristow also will recommend upgrades or modifications to the AW609, if necessary.

The agreement is limited to the development phase and does not commit Bristow to acquiring the AW609 after certification. It does, however, allow Bristow exclusive access to AgustaWestland's programme team prior to certification, so that the aircraft can be optimised to serve the company's commercial purposes.

AgustaWestland, which acquired former partner Bell Helicopter's share in the programme in 2011, says the AW609 has nearly 60 customers across a range of missions. ■



The \$24 million tiltrotor was exhibited in Bristow's livery



First of the H generation is touted as 'the AW139 killer'
COVER STORY P18



Bell Helicopter

Enhancements have been made to the flightdeck and engines

CONTRACT

Bell rings in new 407GXP with 200-unit EMS deal

Bell Helicopter has launched a slightly heavier weight variant of the 407GX with a blockbuster order for 200 aircraft from Air Methods, a US-based helicopter emergency medical services operator.

The 10-year contract calls for deliveries to begin in 2016 to the Colorado-based company.

"The Bell 407GX is the right fit for our needs," says Aaron Todd, chief executive of Air Methods.

The 407GX updates the light-single, long-range aircraft with a Garmin G1000 flightdeck.

The Air Methods deal launches the 407GXP derivative, which adds 22.5kg (50lb) to the maximum take-off weight. The upgrade includes improvements to the Rolls-Royce M250 engine, along

with a 500-flight hour extension to the time between overhaul rating.

All 200 aircraft ordered by Air Methods will be equipped with a United Rotorcraft emergency medical services interior. The aircraft also has new avionics features such as a hover performance calculator improvement.

In addition, Bell has secured an important commitment for its clean-sheet 525 Relentless super-medium with a letter of intent from Waypoint Leasing covering the acquisition of 20 helicopters, with a further undisclosed number covered by options.

The first flight of the fly-by-wire-equipped 525 is "scheduled for spring 2015", says Bell, with certification and first delivery in the following year. ■

UPGRADE

AW139 beefed up to tackle new rival

Medium-class stalwart gains higher gross weight as it looks to counter challenge from Airbus Helicopters' latest offering

AgustaWestland has launched a heavier version of its AW139 twin-engine helicopter, upping its maximum take-off weight (MTOW) to 7t from the present optional top limit of 6.8t.

The new increased gross weight retrofit kit takes the baseline rotorcraft's MTOW from 6.4t and is an option on all AW139s.

Industry observers view the move as a direct response to Airbus Helicopters' introduction of the much-anticipated X4 – now called the H160 – which it has pitched squarely at the AW139. The announcements were made nearly simultaneously at the show.

The heavier AW139 achieves the increased payload capacity with reinforcements to the tail boom and modified landing gear and tyres. Power still comes from two Pratt & Whitney Canada PT6C engines.

James Wang, AgustaWestland's senior-vice president of marketing, says the aircraft has surplus power that the company has found a way to tap into. However, the retrofit does negatively im-

pact the aircraft's performance while hovering in and out of ground effect, he says.

Operators of existing AW139s – there are about 730 examples in service – can integrate the retrofit kit to gain either an extra 600kg (1,320lb) or 200kg of payload, AgustaWestland says, depending on whether they already have the higher MTOW kit installed.

AgustaWestland already is integrating baseline weight-saving kits on new AW139s built in 2015. Those kits offer a 100kg increase in payload. With the 7t kit also installed, the total increase in payload is 700kg. Deliveries of those baseline-upgraded aircraft will begin later this year.

The company sees the 7t AW139 as a competitor to existing production aircraft, including Airbus Helicopters' larger EC175 – now re-designated the H175 – on long-range missions with up to 12 passengers.

Configured for offshore work, the 7t AW139 will have a flight radius of 230nm (426km) when carrying eight passengers, AgustaWestland says. ■

PROGRAMME

Composite's certification plans withstand crash

Flight tests of the KC630 light-single should resume by the end of the year after New Zealand-based manufacturer Composite Helicopters integrates design changes following a non-fatal crash of a prototype in November.

The Auckland-based start-up now expects to achieve type certification in 2017 of the Rolls-Royce RR300-powered KC630, followed a year later by certification of the R-R M250 C20B-powered KC640, says chief designer Peter Maloney, who survived the November incident.

The company also plans a slightly more powerful KC650 helicopter, but has not yet selected an engine. Options include the R-R M250 C30 and the Honeywell LTS101, Maloney says.

As an all-composite airframe pitched at the light helicopter market, the company's designs are aimed squarely at the short-range, light-single segment dominated by the RR300-powered Robinson R66. Bell Helicopter, meanwhile, will re-enter the segment later this year with the Turbomeca Arrius 2R-powered 505 Jet Ranger X. ■



Composite Helicopters International

Both current models utilise Rolls-Royce turboshaft engines

ROTORCRAFT DOMINIC PERRY MARIGNANE

First of the H generation is touted as 'the AW139 killer'

Airbus Helicopters confident that repositioned H160 will tackle success of rotorcraft rival

Airbus Helicopters ended months of speculation on 3 March, with the official unveiling of the new H160 medium-class helicopter, which it has repositioned in order to be what chief executive Guillaume Faury describes as "the AW139 killer".

To effectively target the strongly selling AgustaWestland type, Airbus Helicopters has significantly altered the capabilities of its new model over the past 24 months.

Initial concept studies in 2012 envisaged the rotorcraft – then known as the X4 – as a direct replacement for its 4.5t AS365 and

4.9t EC155 Dauphin family. However, the airframer has changed course. It has upped the maximum take-off weight for the new product to 5.5-6t, promising to be able to carry 12 passengers a distance of 120nm (222km) with a cruise speed of 160kt (296km/h) at ISA +20°C. In other words, matching the performance of the AW139, while weighing 1t less.

In addition, Faury claims the H160 will be 15-20% more "energy efficient" than its rivals.

First flight is scheduled for later this year, with certification

and service entry envisioned for 2018. Flight testing will be performed with three prototype aircraft and one pre-serial example. Orders for the new rotorcraft will begin to be taken next year.

Faury says the company repositioned the H160 according to the market's view of "what a medium helicopter is today".

CONFRONTATION

What matters for customers, he says, is the performance of the aircraft, combined with safety, reliability, efficiency, comfort and ease of maintenance. "We will confront the AW139. I believe it will have difficulty to compete with the H160 on all these parameters."

"It [the H160] will be more competitive in all aspects. It will be the reason that customers move in the direction of the H160. This is clearly the new generation

A fully composite airframe, new Turbomeca engines and five-blade Blue Edge rotors are key features on the H160

in this segment and clearly will be much better than the competition. It is the AW139 killer."

Although Airbus Helicopters has ditched many of the advanced features seen on the initial concept study – most notably its fly-by-wire



The H160 features a canted Fenestron and "biplane" stabiliser

Customer satisfaction key to strategy

While the H160 may not feature the huge leaps forward in technology that were originally envisaged, it represents a revolution in the way that Airbus Helicopters develops and industrialises its products.

The architect of this change is chief executive Guillaume Faury, who has led the transformation of the business since taking charge in 2013.

Although the most symbolic move was to ditch the old Eurocopter brand in favour of closer alignment with its Airbus Group parent, Faury is keen to stress that the change is more than skin deep, in that the rotorcraft producer has also adopted processes from its bigger fixed-wing sibling.

Work on the H160 – then known as the X4 – was already

under way when Faury arrived from car manufacturer PSA Peugeot Citroën. Although that continued, there were changes to its scope.

"Being in a big transformation phase, I decided that this programme should be consistent and in line with what we are doing with the transformation," he says.

The H160 is, says Faury, "the first helicopter born under the Airbus Helicopters brand".

Customer satisfaction is now at the core of the business, he says. "We have new ways of working, and a high level of ambition driven by our customers." Key to that is ensuring the maturity of its products and the support networks underpinning them well before service entry.

Bernard Fujarski, programme manager of the H160, says its benchmark is the Airbus A350. "Both are fully composite aircraft



“We will confront the AW139. [The H160] will be more competitive in all aspects. ... It is the AW139 killer”

GUILLAUME FAURY

Chief executive, Airbus Helicopters

controls – it still sees the new rotorcraft as being significantly ahead of its peers. It will feature a fully composite airframe, with the main fuselage made in-house at its Donauwörth manufacturing centre in Germany and the tail boom fabri-

cated by France's Daher. The five-blade main rotor uses the distinctive hockey stick-shaped Blue Edge blades, and avionics will be the latest iteration of the Helionix suite that entered service on the EC175 and EC145 T2 last year.

Other notable features include a shrouded Fenestron tail rotor which is canted at 12° to provide additional lift, a rear “biplane” stabiliser on the tail to improve low-speed handling, and electric landing gear and brakes.

and there has been a lot of cross fertilisation between the two technical teams,” he says. “Airbus is a little bit ahead of us and we have taken a lot of benefits from them in industrialising the concept.” This has included leveraging experience gained in programme management and the creation of a validation and certification programme.

If this new process is believed with almost religious fervour at Airbus Helicopters, then the temple of this new fundamentalism sits at the centre of its Marignane facility near Marseille.

Comprising a pair of three-storey, concentric concrete cylinders with a retractable roof, the manufacturer's newly completed dynamic helicopter zero test area is, says head of vehicle testing Gary Clark, designed to “ensure a high level of maturity before entry into service”.

“The more we find here and the more we test here, the easier it is in the flight test phase,” he notes.

And as Faury points out, the new test area “allows us to bring the helicopter to life and into service with a faster development process”.

Inside the smaller of the two cylinders, a semi-complete H160 is already being installed, ahead of a likely first ground run later this month. All the dynamic systems – engines, gearbox, main and tail rotors – are present, and everything connected to or controlling or suspending those components.

Its fixed-wing equivalent, says Clark, is the iron bird test rig used by Airbus to perform static ground tests on its prototype aircraft.

A second parallel test facility, the system helicopter zero, is tucked away in an anonymous office block nearby. Here, the helicopter's avion-

ics and other systems are integrated and tested together.

Eric Janssonie, head of the facility, estimates that 400 to 500 “snags” will be detected by the evaluation process – snags that would otherwise remain undetected until the start of flight testing.

The bottom line is that the use of both test facilities should mean that a significant number of problems have been wrung out of the H160 well before experimental test pilot Olivier Gense fires up helicopter PT1 ahead of the first flight later this year.

As Fujarski points out: “The first ground run of dynamic helicopter zero is for us as important as the first flight. It is not as emotional or dramatic, but for us it is exactly the same kind of important milestone.”

“There is a very important level of expectation [from customers]. Not by having this or that technology, but by assuring first a high level of availability, high performance, high comfort [through] lower levels of noise and vibration, size and speed,” says Faury.

REPOWERING

Although much of the helicopter's configuration has been frozen for some time, the airframer last month dropped Pratt & Whitney Canada's PW210E as an option, despite previous indications suggesting it would be the lead engine.

Instead, it will proceed with a sole powerplant in the form of the more powerful 1,100-1,300shp (820-969kW) Arrano being developed by France's Turbomeca.

However, initial ground runs of the manufacturer's dynamic helicopter zero test rig are likely to be conducted with already-delivered P&WC powerplants. ■

H160 SPECIFICATIONS

Engines	2 x Turbomeca Arrano
Maximum take-off weight	5.5-6t
Cruise speed	160kt
Range (12 pax)	120nm*
Maximum range	450nm**
Hover out of ground effect	5,000ft
First flight	2015
Service entry	2018

NOTES: *ISA +20°C **with 20min reserve
SOURCE: Airbus Helicopters



EXPORTS GREG WALDRON SINGAPORE

Boeing keeps up fighting spirit for Super Hornet sales

Boeing remains bullish about the prospects for more international sales of its F/A-18E/F Super Hornet, as the end of production in 2017 starts to loom.

"We have to evaluate all these competitions against the timing of the assembly line," says Chris Raymond, vice-president, business development and strategy for Boeing Defense, Space & Security. "You don't want to stop, but you've got to be thoughtful about what delivery schedules will be and what the status of the line will be at that time, because you've got to factor this into your pricing."

One key campaign is Kuala Lumpur's multirole combat aircraft (MRCA) requirement for 18



Commonwealth of Australia

Australia operates 24 F/A-18Fs and has 12 EA-18Gs on order

fighters, which will be in the spotlight at the LIMA exhibition in Langkawi later this month. The long-running requirement to replace the Royal Malaysian Air

Force's 10 obsolete RAC MiG-29s is also being contested by the Dassault Rafale, Eurofighter Typhoon and Saab Gripen NG.

"We take any competition for

more fighters seriously," says Raymond. "There is no arguing that [MRCA] has been talked about for a long time, but we have to keep pursuing it. Hopefully the politics and budget will be right for it to move forward at some time."

Raymond also refers to Canada and Denmark as potential buyers, along with "a couple of countries in the Middle East". Opportunities could also arise to sell more F/A-18E/Fs or EA-18G electronic warfare aircraft to the US Navy, he says.

Australia is Boeing's lone export customer for the Super Hornet to date, with 24 F-model examples in use and 12 EA-18Gs on order. ■

See Feature P27

INCIDENTS

ARIE EGOZI TEL AVIV

Safety worries prompt Israel to suspend training

Following a series of safety incidents, Israeli air force commander Maj Gen Amir Eshel ordered a one-day suspension of all training flights from its bases on 26 February.

The directive, which did not apply to the service's operational activities, was issued to give flightcrews time to go through all required safety procedures.

Eshel's order followed a mid-February incident during which two Boeing F-15s came within close proximity of each other during a training flight. One of the pilots was sentenced to five days in jail for careless flying.

A similar incident also occurred on 25 February, when a Lockheed Martin F-16 and a Lockheed C-130 tactical transport passed close to each other. An earlier case saw a car driven onto an active runway, shortly before a combat aircraft began its take-off run. ■



Visit the Ariel View blog for more coverage about Israeli topics:
flightglobal.com/arielview

PROGRAMME DAN THISELL MUNICH

A400M hits delivery bumps

Airbus reduces its target for 2015 as incomplete sub-assemblies slow down Seville line

Airbus is heralding mixed fortunes for its troubled A400M tactical transport programme, with expected deliveries in 2015 of 16 units – double 2014's total – coming on the back of a €551 million (\$610 million) fourth-quarter charge for delays and action needed to ramp-up production.

Highlights of the 2015 delivery campaign should include five more aircraft for the UK Royal Air Force, which received its first two examples late last year. But original expectations for the total transfer of more than 20 units are out of reach.

Speaking in Munich on 27 February, Airbus chief executive Tom Enders blamed the A400M's woes on incomplete sub-assemblies arriving at the Seville final assembly line in Spain. Fuselages delivered from Bremen in Germany are a particular problem, he says, but wings from Filton in the UK and inputs from other plants are also arriving needing further work.

This "travelled work" means personnel from the sub-facilities have to work temporarily in Seville, which is "very inefficient".

However, says Enders, the

change of programme management made in late January is encouraging. Fernando Alonso, who replaced Domingo Ureña-Raso as head of military aircraft within the Airbus Defence & Space division, is "a great manager coming from the commercial side", he says, while new head of operations Pilar Albiac-Murillo comes from the automotive industry and knows how to fix a final assembly operation.

Further details of the financial implications of the A400M programme remediation requirements are expected to be released in the coming weeks.

Also on 27 February, aircraft ZM402 arrived at the RAF's Brize Norton base in Oxfordshire. This is the UK's third of an eventual 22 A400Ms, with the second still in Spain having defensive aids system equipment installed. Earlier plans had called for the service to achieve initial operational capability with the Atlas this month, with seven aircraft available. ■

Additional reporting by Craig Hoyle in London

See News Focus P25



Crown Copyright

Seven Atlas transports should be in RAF use by the end of 2015



Seahawk support
deal given \$2bn
extension
DEFENCE P22

ACQUISITION ANNO GRAVEMAKER ARNHEM

Dutch parliament approves F-35A buy

MPs commit to Joint Strike Fighter with first batch of eight Lightning IIs for Royal Netherlands Air Force expected in 2019

The Dutch parliament has approved an order for the nation's first production batch of eight Lockheed Martin F-35A Lightning IIs, which will be delivered in 2019.

"With this decision, we have reached the point of no return in the replacement of the [Lockheed] F-16," says defence minister Jeanine Hennis-Plasschaert.

The Royal Netherlands Air Force already has two F-35As, acquired to support US-led initial operational test and evaluation of the Joint Strike Fighter, and now located at Edwards AFB in California.

TRANSITION

From its next batch of eight aircraft, which will be assembled at Lockheed's Fort Worth site in Texas, six will remain at a multinational pilot training centre at Luke AFB, Arizona, until the end of a transition process in 2023. The two Dutch test aircraft will also be relocated to this facility on the completion of evaluation work.

Longer term, five F-35As will be retained in the USA for training and testing purposes, with the rest to equip three squadrons based in the Netherlands. Three more batches of eight aircraft

each will be ordered between 2016 and 2018, before a final three are expected to be purchased in 2019, completing an operational buy of 35.

All of these will be delivered from a final assembly and check-out centre built at Cameri air base in Italy.

The first operational unit in the Netherlands will be 322 Sqn at Leeuwarden air base. This should achieve initial operational capability in 2021, using aircraft in the Block 3F software standard. At this point, the air force will be able to provide four aircraft and sufficient crews for international missions for a period of three to four months.

Full operational capability with all three frontline units – including the Volkel-based 312 and 313 squadrons – should be achieved in 2024. The defence ministry plans to have 29 combat-ready pilots for an operationally available force of 32 F-35As.

The Netherlands' total budget for the F-35 programme is listed as almost €3.87 billion (\$4.32 billion), including around €2.5 billion for the purchase of the airframes. Other major investments are of roughly €130 million for spare parts and about €110 million for a flight simulator. ■



The nation already has two examples under evaluation in California

MAINTENANCE STEPHEN TRIMBLE WASHINGTON DC

R-R's LiftFan repair centre opens doors

Rolls-Royce has opened the first repair and overhaul facility for the Lockheed Martin F-35B's LiftFan propulsion system, as it also consolidates the assembly of major components away from the UK.

The \$10 million LiftWorks facility in Plainfield, Indiana, will serve as an interim logistics hub for short take-off and vertical landing F-35Bs operated by the US Marine Corps and the UK. It could eventually be augmented or replaced by the US government depot system, or by facilities in Italy or the UK, should either nation decide to make such an investment, says R-R senior

vice-president Tom Hartmann. LiftWorks sits "a few doors down" from R-R's LiftFan final assembly centre in Indianapolis, to where the company has transitioned most production work from Bristol in southwest England.

The last major piece of the system currently produced in the UK – the 3D swivel bearing nozzle – is moving to the Plainfield site as an affordability measure, Hartmann says. R-R is reviewing more than 150 other changes with the F-35 joint programme office that could potentially lower the unit price of the LiftFan system. ■

CONTRACT DAVID KAMINSKI-MORROW LONDON

Moscow to boost tanker fleet with Il-96 conversion

Russia's United Aircraft has approved a plan to produce two aerial refuelling tankers, based on the Ilyushin Il-96, for the country's air force. The conversion is being designated as the Il-96-400TZ, signalling its derivation from the -400T freighter variant.

Voronezh-based VASO built only a small number of the freighters, initially intending to deliver them to Aeroflot but subsequently handing the aircraft to cargo carrier Polet.

Russia's defence ministry says

it has agreed to acquire two Il-96-400TZs under a contract with United Aircraft. It says the

aircraft will be able to transport over 65t of fuel across a range of 1,900nm (3,500km).



Cargo carrier Polet previously operated the -400T freighter

The Il-96s will be equipped with the Zvezda UPAZ-1 aerial refuelling system, which has been previously proven on the fleet of 19 Il-78 tankers now flown by the Russian air force.

United Aircraft says it has approved a state contract to modify and deliver the two aircraft. In a February board meeting, it had confirmed reaching an agreement with lessor Ilyushin Finance covering the purchase of a single Il-96-400T formerly used by Polet. ■



US Air Force

The LRSO effort is to produce a successor for the B-52's AGM-86

PROGRAMME STEPHEN TRIMBLE WASHINGTON DC

USAF could give supersonic boost to cruise missile

Propulsion options for long-range standoff weapon also include two subsonic engines offering fuel efficiency gains

The US Air Force will consider a supersonic engine among three propulsion options now under review for the long-range standoff (LRSO) missile, according to an acquisition notice released on 26 February.

The LRSO is expected to replace the Boeing AGM-86 air-launched cruise missile carried by the Boeing B-52H: a subsonic weapon powered by a Williams F107 turbofan engine.

According to a request for information (RFI) released by the LRSO branch of the Air Force Life Cycle Management Center, the service is considering two subsonic engine options – a derivative of an existing engine with 5% greater fuel efficiency and an advanced engine offering an improvement of up to 20%. A third option under review is a supersonic engine that would be sized comparably to “existing small core expendable engines”, the acquisition document says.

In the past, the USAF has said that the LRSO would be a stealthy cruise missile, but never specified whether the weapon would fly at speeds below Mach 1.0, between M1.0 and M5.0 (supersonic) or even faster (hypersonic).

The same document lays out the USAF's plans for developing and producing the LRSO.

At least five engines will be delivered to support a technology maturation and risk reduction phase, while another 89 will support the programme's engineering and manufacturing development phase. Up to 1,000 engines will be needed for a five-year production run, according to the RFI.

The USAF proposed to accelerate the LRSO acquisition programme by two years in its fiscal year 2016 budget request submitted to Congress last month. The new design will be among the weapons carried by the service's future long-range strike bomber. ■

CONTRACT STEPHEN TRIMBLE WASHINGTON DC

Seahawk support deal gets \$2bn extension

A Lockheed Martin and Sikorsky joint venture will expand its support of more than 500 H-60-series helicopters for the US Navy, under a \$2 billion, five-year contract renewal awarded on 27 February.

The award will extend the Maritime Helicopter Support Company's (MHSCo) performance-based logistics contract with the navy to 2019, as the service transitions to a fleet of only MH-60R and MH-60S anti-submarine warfare and maritime patrol variants.

As the fleet consolidates to a larger overall number of the two Seahawk models, MHSCo's contract will also expand to cover more than 1,700 parts – compared to 1,266 included under the new arrangement.

Although some other performance-based support contracts have come under fire in the USA due to concerns about excessive profits, Lockheed and Sikorsky officials say their deal should serve as a new model for such agreements.

Starting in 2010, MHSCo incorporated provisions that allow the US government to split the profits on parts that did not need

“It served a very good function to [show] the government that they are getting excellent value for ... money”

ROD SKOTTY

President, MHSCo

to be repaired or replaced as often as had been forecast. The joint venture has also agreed to give navy officials visibility into its costs.

“We believe that it served a very good function to demonstrate to the government that they are getting excellent value for the money they are spending,” says Rod Skotty, president of MHSCo. “Other [contractors] chose not to follow suit, and they suffered the consequences as a result.” ■



US Navy

More than 500 MH-60R/S rotorcraft are covered for the US Navy

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standard
NEWS FOCUS P24



Eclipse Aerospace

Customers will each buy up to a one sixth share in the \$2.95 million Eclipse 550

VERY LIGHT JETS KATE SARSFIELD LONDON

Scheme to split the Eclipse

Aeris Aviation says plan for sharing ownership of VLJ makes private flying accessible

Aeris Aviation – the independent European distributor for the Eclipse 550 – has launched what is believed to be the first shared ownership programme in Europe for the very light jet, and hopes to sign up the scheme's first owners by the end of the month.

The venture will operate on a private ownership basis, with customers buying up to a one-sixth share in the \$2.95 million Eclipse 550. "This makes private air transport accessible to a lot more people," says Aeris founder and chief executive David Hayman. "We are in talks with our first group of owners and hope to sign them up soon," he adds.

This aircraft will be delivered at the end of April, but subsequent

owners will have to wait for up to nine months as each Eclipse 550 is made to order, he says.

The shared ownership programme is managed by Aeris. "As well as the initial acquisition price [broken down by share size], owners pay a monthly management fee of £3,500 [\$5,300], which covers the cost of crew, hangarage and maintenance and an occupied hourly rate of £1,500, which excludes empty legs," says Hayman.

The aircraft will be operated on the US N-prefix registry, as the model is not expected to secure European certification until the second half of the year.

"We have had a lot of interest," Hayman says. "While our first group is London-based, we ex-

pect the majority of the shared owners will be positioned across the UK, where the transport links to Europe are not as good."

Aeris is also looking to roll out the programme across the continent and is building partnerships in France, Italy and Norway.

The scheme is a step towards Aeris's long-term goal to launch commercial operations in Europe with the Eclipse 550, and Hayman is confident the EA550 will be a popular choice for travellers.

"In the USA between 80% and 90% of the [230+ Eclipse types] are owner-flown and the rest are operated commercially," he says. "I think this ratio will be reversed in Europe as people realise the benefits of this aircraft." ■

TRAINING
KATE SARSFIELD LONDON

HondaJet gains simulator ahead of service entry

Honda Aircraft is installing the first HondaJet simulator at its headquarters in Greensboro, North Carolina, ahead of the light business jet's entry into service in the first half of this year.

Developed in partnership with FlightSafety International, the full-motion, level-D simulator will be housed at the newly-constructed HondaJet Training Centre and will be certificated to US and European regulatory standards. FlightSafety has also developed the training programme in partnership with the American Honda Motor subsidiary.

Honda is ramping up production of the GE Honda HF120-powered twin and plans to deliver 50 aircraft in 2015 and up to 80 in 2016. The \$4.5 million jet has a 420kt (780km/h) cruise speed and a range of 1,180nm (2,180km). ■

RENAMING

Daher drops Socata brand from TBM line

French industrial conglomerate and aerostructures company Daher has dropped the Socata branding from its TBM single-engine turboprop line, ending a 26-year association between two well-known names in business and general aviation.

The move comes six years after Daher acquired a 70% stake in the Tarbes, southwest France-based airframer, which currently produces the high-speed TBM 900.

"The main reason was to keep the branding simple," explains Daher's director of product marketing, airplane business unit, Philippe de Segovia. "Aero-space activity represents roughly 70% of Daher's sales."

Daher has produced over 700 TBM turboprop singles since the first iteration – the TBM 700 – entered service in 1990. ■

MAINTENANCE KATE SARSFIELD LONDON

SR Technics wins Royal Jet MRO deal

VIP charter operator Royal Jet has awarded Switzerland's SR Technics a five-year contract to maintain, repair and overhaul the CFM International CFM56-7B engines on its six Boeing Business Jets – the largest BBJ fleet in the world.

Work on the first narrowbody began late last month at SR Technics' facility in Zurich.

Abu Dhabi-based Royal Jet has a further two BBJs on order, which are scheduled for delivery

to an undisclosed completion centre in September and December respectively. Their acquisition is part of a \$700 million

spending commitment by Royal Jet on new business aircraft. The company aims to grow its fleet from 11 to 20 aircraft by 2020. ■

The Abu Dhabi-based operator has the largest BBJ fleet in the world



Royal Jet



LEGISLATION BETH STEVENSON BRUSSELS

Harmonising the unmanned standard

Air traffic management and regulation across Europe needs to adapt to the presence of UAVs, despite funding shortfall

On 3 and 4 March, representatives from ICAO, EASA and the European Commission stood before the AUVSI Unmanned Systems Europe conference in Brussels and stressed the importance of developing a harmonised set of regulations to integrate unmanned air systems into national airspaces.

Air traffic management was at the heart of many representatives' priorities, as discussions centred on how this new technology will be integrated into a manned aviation control system.

ATM will not adapt to UAV integration, they say, and instead the operation of unmanned systems will have to feed into current air traffic control. However, more can be done to harmonise this process across Europe than is currently the case.

"Nationalised and not very harmonised is the current situation," Vicente de Frutos Cristóbal, seconded national expert and policy officer for the European Commission, says.

ACCEPTANCE

In order for UAV operations across Europe to become more harmonised, more routine exposure to non-segregated airspace is required – as is a public acceptance of unmanned operations, which varies across different nations.

The Commission's Single European Sky ATM Research (SESAR) effort aims to modernise and harmonise UAV operations, Cristóbal says, and an upcoming remotely piloted air system (RPAS) element in SESAR's new "2020" strategy will facilitate this further.

However, Denis Koehl, senior advisor for military affairs on the programme, admits that the effort to integrate unmanned aircraft into the future ATM system is under-funded. His disclosure came ahead of a Commission-sponsored conference on the future of ATM that began on 5 March in Riga, Latvia. This was expected to produce decisions on the commit-



EASA has so far looked at civil certification requests for large systems like the Airbus-built Atlantique

ment that the EU will make towards the integration of UAVs into the SESAR programme.

SESAR 2020 is due to begin by the end of this year and carry on until around 2024, and UAVs are being considered for the first time. However, in order to incorporate the equivalent of both manned visual flight rules (VFR) and instrument flight rules (IFR), more money is needed.

"Everybody wants standards, but everybody wants standards that are agreeable to them"

MIKE GADD
ICAO representative

"At the end of the day this is all about money – and the cheapest option is not what we want," Koehl says. "What we propose is to fully integrate RPAS into the aviation system, but we want – and I am convinced that the Commission is aware that we need to have the full package – IFR and VFR. The [total] cost of this is €150 million [\$166 million]."

Koehl says that the current available budget is nearer €40 million, which would only allow for a token amount of work to be carried out, although most concerned

parties want "the full package".

Meanwhile, the UK Civil Aviation Authority's Mike Gadd, who was representing ICAO, says the organisation's RPAS working panel is aiming to set a global minimum standard. This is a challenge, he says, because it has 191 member states. Some 31 countries and organisations are on the RPAS panel, and a further seven are observers.

The current scope of ICAO's RPAS work is to integrate IFR-equivalent UAV operations in controlled airspace, because this is the minimum standard globally. This, Gadd admits, is not necessarily where a lot of European nations and organisations are in their UAV integration process, but he says this is not ICAO's concern.

"Everybody wants standards, but everybody wants standards that are agreeable to them, and that costs time," Gadd says.

EASA's innovation and research manager, Eric Sivel, says that the incorporation of UAVs into national airspace has driven the safety authority to modernise its practices and become more flexible in response to the new technology.

Eleven documents are required for a manned commercial flight to be permitted. In the case of unmanned aircraft, however, requirements for documents such as medical certificates and

certificates of insurance may not be applicable.

"Making RPAS safe using the current model is going to cause an imbalance, so we are forced to change the way we work," Sivel says. "This is not a small change, it's a fundamental overhaul. There are prescriptive rules in aviation – you say 'do it'."

CHALLENGES

Sivel adds that UAVs "pose challenges and questions that we as aviators had never asked ourselves", and that a "change in cultures" is becoming apparent.

Instead of applying blanket restrictions on UAVs, as is the case with manned aircraft, some RPAS operations will need to be considered on an individual basis and regulated as such.

While EASA and the Commission are focused on UAVs with a weight of 150kg (330lb) and above – individual nations typically mandate the requirements of systems that are below this weight – Cristóbal expresses a desire for both bodies to take over more regulatory responsibility of lower weight systems.

UAVs that weigh just a few kilograms will invariably be controlled by each nation, but EASA and the Commission will eventually take over systems in between. This move is "currently under consideration". ■



Malaysia's malaise
FEATURE P27

BUSINESS DAN THISDELL MUNICH

For Airbus, it's only clear skies ahead

Record deliveries, rising profits and surging civil aircraft demand leave investors sanguine about military aircraft troubles

To sum up the current state of Airbus Group, look to the A350. Calendar year 2014 ended with the first delivery of the type – to Qatar Airways – after a mostly uneventful test flight campaign. Now the priority is to give Qatar a second example and get on with raising output to hit 18 per month in 2017 and service a backlog of nearly 800 aircraft.

Group chief executive Tom Enders sums up the priorities for 2015 in two words: “ramp up”.

Presenting solid financial results for 2014 in Munich on 27 February, Enders described 2015 as a year of “transition”. In addition to continuing the A350's move to its production phase, the company's “bread and butter” A320 programme is in flux.

Come October, Airbus expects to deliver the first of its Neo versions with Pratt & Whitney's PW1100G-JM engines.

First delivery of the CFM International Leap-powered option will follow in 2016, and Airbus will raise output to 50 aircraft per month from the first quarter of 2017 – while studying the “feasibility” of a further move to “60-plus”.

INVESTMENT

The A380 is also making a dramatic transition: from loss-making to break-even. Whether the programme ever moves into the black remains to be seen, but after 15 years of investment, eight years in service, more than 150 aircraft delivered – including 30 in 2014 – and “triple digit millions” still going into improvements annually, Airbus expects this year to start taking in more money for each superjumbo delivered than its marginal cost of manufacture.

Whatever question marks hang over the A380 – such as how many orders will be made beyond the 162 in the backlog today, and whether or not a re-engined Neo version makes economic sense – Enders reckons



Qatar Airways put its first A350 twinjet into service on 15 January

the programme “is in as good a situation as we want it in 2015”.

The same might be said of the whole company. In 2014, revenue improved by 5% to €60.7 billion (\$68 billion), but profits – earnings before interest and tax – soared 54% to €4 billion; a 6.7% return on sales.

Notably, Airbus delivered a record 629 civil aircraft and took more than twice that many orders. The group expects 2015 deliveries to set another record, still with a rising backlog. Profit growth will be only “slight”, as 2014 was excellent and this year will feature A320 and A350 ramp-up costs. But, says chief financial officer Harald Wilhelm, subsequent years should see a return to strong profits growth.

At Airbus Helicopters, business grew by 4% last year, with revenue of €6.5 billion, and although at the Defence & Space division sales dipped 1% to the high side of €13 billion, the space part enjoyed its best year ever. The latter is looking for more of the same in 2015, with a book-to-bill ratio greater than one and the flagship Ariane 5 rocket continuing its run of 63 flawless launches.

Airbus and Safran are also making good progress in forging the joint venture, formally created in December, to consolidate

the Ariane 5 and 6 programmes in a bid to transform their cost base. Better yet, to hit the 50:50 balance, Safran will be paying Airbus €800 million.

“We don't see dark clouds for aerospace industries – unless the world comes tumbling down”

TOM ENDERS

Group chief executive, Airbus

That payment, along with strong commercial performance and probable disposal receipts – including from tranches of shares of Airbus's minority stake in Dassault Aviation – make the group look like a cash-generating machine, with reserves of €9.1 billion and growing.

Cash demand is great, given the heavy programme ramp-up schedule, but Societe Generale aerospace analyst Zafar Kahn reckons that Airbus may consider returning more cash to shareholders with a buy-back, perhaps from 2016.

Defence remains the weak link. The A400M tactical transport is behind its delivery schedule, as reflected in a fourth

quarter 2014 charge of €551 million, and Eurofighter is desperate for a next export order.

As Jefferies equities analyst Sandy Morris sees it, the A400M could be a big problem if the relationship between Airbus and any of its customers proves less than robust. However, he says, the “A400M is shaping up to be a good aircraft. My hope – and my belief – is that everyone will now pull together to get it over the line.”

Ultimately, Morris's note on Airbus sums up the general view of the company: “Juggernaut”.

INNOVATION

Investec's Rami Myerson is similarly upbeat, if less dramatic. Shares are trading at around their all-time high of €55 and strong results in 2014, he says, point to “further upside to the shares from better execution and strong positions in a growing market”.

That is a step ahead of five years ago, when margins were meagre and Enders' predecessor, Louis Gallois, declared unequivocally that profitability had to improve. Improve it clearly has, thanks to a steady focus on cost, efficiency and innovation.

Moving past the A380's early-stage production problems has helped, and Airbus is also enjoying the strong dollar, which translates into good money in its home currency, the euro.

Despite the worst financial crisis in decades, there has been help from surging demand for air travel, especially in increasingly wealthy emerging markets. As Enders says, even airlines – notoriously prone to losing money – are booming, with 2014 industry profits at some \$20 billion and a better year to come. Profitable airlines are “better customers”.

Broadly, Enders says, there has been talk of dark clouds around the aerospace industry for years, “but we don't see it – unless the world comes tumbling down”. ■



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MALAYSIA'S MALAISE

Ahead of the biennial LIMA air show we look at prospects for the nation's once-booming rotorcraft sector, slow-moving defence procurement contests and troubled long-haul carrier Air Asia X



Airbus Helicopters

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Airbus Defence & Space, Airframeimages

Main image: an Airbus Helicopters EC225; **above left:** the Airbus A400M will boost the capabilities of the Malaysian air force; **above right:** X-tra problems for Air Asia X

HELICOPTERS

Oil well for rotorcraft?

LIMA is the region's key event for helicopters, but will the slump in the price of Brent Crude affect their sales prospects?

GREG WALDRON SINGAPORE

Big orders for passenger jets tend to dominate air shows. At Paris, Farnborough, Dubai and Singapore, helicopters – while present – tend to be overshadowed both on the static display and by airline deals.

Although the Langkawi International Maritime & Aerospace (LIMA) exhibition is admittedly among the industry's smaller shows, with negligible action on the commercial front, it is Southeast Asia's premier event for helicopter makers.

The biggest LIMA stories in 2011 and 2013 all revolved around helicopter sales. In 2013, local offshore support firm Weststar used the event to announce orders for six AgustaWestland AW139s and two AW189s, as well as a memorandum of understanding with Airbus Helicopters (then called Eurocopter) for two EC225s. In 2011, both firms also had orders, with Airbus Helicopters announcing a major maintenance, repair and overhaul facility in Kuala Lumpur.

HURDLES

Malaysia is a major market for helicopters. Private and commercial users of rotary-wing assets in the country face fewer operational hurdles than in neighbouring countries such as Thailand or Singapore. In both countries, air traffic control obliges helicopters to “taxi” to the runway using a low hover just feet off the ground, where they are then allowed to climb out – essentially mimicking the actions of a fixed-wing aircraft. Landing, again, requires an approach similar to a fixed-wing aircraft,

including a gradual descent to a low hover above the runway, followed by “taxiing” back to the ramp. In Malaysia, however, ATC allows helicopters to make a normal hovering ascent, and grants them far more leeway in flight planning and selecting landing spots.

Flightglobal's Ascend Fleets database shows that there are 252 helicopters in service with Malaysian operators, including the country's military and paramilitary forces. The market leader, by a considerable margin, is Airbus Helicopters, which has 111 rotorcraft flying in the country, or a 44% market share. AgustaWestland follows with 55 in-service helicopters, representing a 22% share, and Sikorsky, with 46, accounts for 18% of the total. The latter's percentage includes the Royal Malaysian Air Force's 29 obsolescent S-61 “Nuri” utility helicopters, which were delivered in the mid-1970s.

Among private operators, Weststar Aviation Services operates the country's biggest fleet, with 30 in-service helicopters, mainly deployed for offshore oilfield support. The backbone of its fleet is 23 AW139s, most of which are equipped with 12-15 passenger seats. It also has three Sikorsky S-76s and, from Airbus Helicopters, three AS365s and one EC120. The operator was the launch customer for the AW189, and took delivery of its first example at 2014's Farnborough air show.

Malaysia's offshore oil market is the key driver of helicopter sales in the country. In late 2013, the nation was a key stop during Airbus Helicopters' regional tour with its new super-medium EC175: a type optimised for offshore operations. As in previous years, the company will have a notable presence at LIMA, especially given that since the last show, it has completed deliveries of 12 EC725s to the air force.

GROWTH

Beyond Malaysia, the European manufacturer sees continuing growth opportunities around the region. It is keeping a wary eye on falling oil prices, which ultimately hurt demand for large, long-range helicopters such as the EC225 family, its key type for operations to deepwater oil rigs.

“Through its multiple investments and co-operation programmes, Airbus Helicopters significantly contributes to the development of local economies and improves the domestic level of aeronautical technology knowledge,” says the company.



Airbus Helicopters has delivered 12 EC725s to Malaysia's air force since LIMA 2013

DEFENCE

Hidden agenda

Two years on, there is still no clarity or progress on Malaysia's MCRA, maritime patrol and AEW&C aircraft acquisition plans

GREG WALDRON SINGAPORE

Langkawi is an idyllic location for an air show, but its sunny skies aren't likely to shed much light on Kuala Lumpur's procurement agenda.

The two years since the last LIMA exhibition have been eventful for the Royal Malaysian Air Force. The show falls just after the first anniversary of the disappearance of Malaysia Airlines flight MH370 in the southern Indian Ocean on 8 March 2014.

Malaysia's air force was active in the first week of the search, when the aircraft was mistakenly presumed to be in the Gulf of Thailand or Strait of Malacca. It later sent Lockheed Martin C-130Hs to Perth in Western Australia, where they participated in the ultimately futile search for the missing aircraft. The service also played a crucial humanitarian support role during floods that swept the northern part of peninsular Malaysia in the last weeks of 2014.

Despite these major events putting Malaysian airpower in the spotlight, all indications suggest Kuala Lumpur is no closer to making decisions about major equipment purchases – especially around its ageing fighter fleet and for another glaring capability gap, a long-range maritime patrol aircraft (MPA).

That is not to say this year's LIMA will be absent of signs of progress. The show is set to see the debut of Malaysia's first Airbus A400M tactical transport. On 30 January, the nation's first example conducted its maiden flight: a 90min sortie from Seville, Spain.

The first of four "Atlas" airlifters on order

for the air force, aircraft MSN22, is also the 16th production example of the A400M, from a 174-unit order book for eight nations. Airbus has previously outlined a schedule to deliver Kuala Lumpur's lead example by the end of the first quarter of this year, with the aircraft to be operated by the air force's 22 Sqn. The show website indicates that the aircraft will participate in the flying display at the show.

The new type will give a major boost to the air force's airlift capability, which comprises 14 Lockheed C-130H Hercules and eight Indonesian Aerospace-produced Airbus CN235s. Flightglobal's Ascend Fleets database shows that the average age of the C-130H fleet is 31 years, with the first examples delivered in 1976, and the last in 1993. Ascend shows that the average age of the CN235s is 15 years.

BRIGHT SPOTS

The A400M, with its superior speed and range, is well suited for operations across the South China Sea between peninsular Malaysia and the provinces of Sabah and Sarawak, which share the island of Borneo with Indonesia and Brunei. The new type's air-to-air refuelling capability could also prove useful, given Malaysia's lack of dedicated tanker aircraft.

Making a second appearance at a LIMA show will be the country's new Airbus Helicopters EC725, all 12 of which have now been delivered. The type serves a number of missions, including utility and combat search and rescue. The EC725s were among the first assets deployed in the search for MH370 last year, and in recent flooding they played a high profile role, delivering humanitarian support.

Apart from the bright spots of the A400M and EC725, Kuala Lumpur is making little, or no, headway in other key areas, namely fighters, maritime patrol and airborne early warning and control (AEW&C).

A long-time observer of the Malaysian military says the country's small, professionally run military is mainly comprised of volunteers. It knows exactly what equipment it needs and the types of missions it will be called on to

The Royal Malaysian Air Force's fleet includes 29 ageing Sikorsky S-61s



Commonwealth of Australia

Airbus Helicopters

Low oil prices hit demand for the EC225

"Due to the fall of the oil price, activity has been reduced. Natural gas production, however, has not been affected. The temporary decrease in prices means only a postponement and not cancellation of most of the projects. Both the aeronautical and energy industries are working on long-term plans. Hence the current situation shall not affect our future development and we continue to keep both the oil companies and operators abreast of our latest developments and product improvement."

The only vertical lift area that will be downplayed at LIMA is in the dedicated attack helicopter niche. The country's military has a need for such a capability, but funding remains a key challenge. Airbus Helicopters brought its Tiger offering to the show in 2011, but not in 2013, and it has no plans to take an example to this year's show. Other manufacturers, such as Bell Helicopter, also have no plans to bring armed helicopters. ■



Commonwealth of Australia

The Typhoon and other fighters put on impressive displays at the previous two shows

» perform. The challenges, as in so many countries, are funding and political support.

Reports of political infighting suggest that prime minister Najib Razak's immediate agenda has little space for defence procurement. Moreover, as oil is a major driver of Malaysia's budget, the recent collapse of oil prices will dent Kuala Lumpur's revenue. New military aircraft may not be seen as a high priority.

The observer points out that Malaysia's overall defence budget for 2015 was M\$17.7 billion (\$4.9 billion). Of this amount, approximately M\$3.6 billion is earmarked for "development expenditure". These funds, amounting to about \$1 billion, will be divided between the A400M programme, the ongoing acquisition of the army's new AV8 armoured vehicle, as well as the building of the navy's first of six second-generation patrol vessels (SGPV); essentially a small frigate that is being produced indigenously.

"The defence budget is already quite low, and the air force must compete with the army and navy for funding," the source says. "There is little money for long-term plans." Singapore's 2014 defence budget of S\$12.2 billion (\$9.8 billion) is far higher, and the city state is considerably more professional in how it allocates funds, he adds. "Malaysia also has a tendency to wait for the best deal. They make decisions based on price and offsets, not necessarily what's best for the air force."

VINTAGE

The longest running – and highest profile – air force challenge is the replacement of its 10 1990s-vintage RAC MiG-29s through the multi-role combat aircraft (MRCA) programme for 18 new fighters. Although the ageing type appeared at the Singapore air show in February 2014, no MiGs are scheduled for the LIMA static line or flying display. Due to be retired at the end of 2015, there are significant questions about the serviceability of the MiG-29 fleet, but virtually no progress is being made on the MRCA procurement.

Still, major fighter makers will again trek to LIMA, despite the clear challenge of selling advanced aircraft to Malaysia's cash-strapped military. Fickle budgets at home and tight production runs all but guarantee their interest in MRCA. The 2011 and 2013 shows were a delight for fighter lovers, with Boeing's F/A-18E/F Super Hornet, Dassault's Rafale, Saab's Gripen and the Eurofighter Typhoon putting on impressive aerial displays. All of the competitors are willing to offer lucrative offsets to win the deal. Except for the Typhoon, all of the fighters will be back at this year's show.

In addition, despite its long coast line, Malaysia's military has made little progress since the last LIMA in setting the stage for an MPA force beyond the four Beechcraft King Air 200s operated by its air force. This is despite a



The ageing fleet of 10 MiG-29s is still up for replacement, but nothing has moved forward

"The defence budget is already quite low, and the air force must compete with the army and navy for funding"

OBSERVER SOURCE

speech by then-defence minister Ahmad Zahid Hamidi in 2013 saying that maritime patrol would be afforded a high priority in the future.

His speech followed the early 2013 incursion by 200 Filipino gunmen in Malaysia's eastern state of Sabah, which resulted in an armed confrontation with Malaysian military forces. Although Kuala Lumpur eventually defeated the interlopers with artillery, air strikes and ground forces, the incident highlighted the vulnerability of Malaysia's long coastlines.

Nonetheless, Malaysia is not believed to have issued a formal request for information about MPA aircraft. An expert on the Malaysian military says that the search for MH370 is seen as a one-off event, and therefore has had no influence on the MPA question.

Similarly, Malaysia's long-running hopes of buying four AEW&C aircraft also appear to be on indefinite hold. The high cost of obtaining and operating such a fleet is a major stumbling block. In 2013 Northrop Grumman created a modest stir at LIMA when it rented a stand to highlight the capabilities of its E-2D Advanced



Malaysia's A400Ms will debut at the show

Hawkeye. Since then it appears to have backed down. While the company will send representatives this year, it has no plans for a stand.

FUTURE INCURSIONS

Among other platforms, Malaysia is to boost its ability to combat future militant incursions by arming its AgustaWestland AW109s and transferring upgraded Sikorsky S-61 "Nuri" utility helicopters to army aviation control – moves prompted by the Sabah incursion. Kuala Lumpur has already outfitted three S-61s with 12.7mm door guns to provide armed support for ground troops.

Malaysia had previously planned to remove its aged Nuri fleet from use by 2012 – 89 personnel have been killed in 15 crashes involving the type since it was introduced. However, the acquisition of just 12 EC725s, as opposed to the originally planned 28, means that the Nuris will soldier on. A package of S-61 upgrades, to be conducted locally by maintenance, repair and overhaul firm Airoad, will see the type receive important enhancements. A night vision goggle-compatible glass cockpit upgrade has already been performed on part of the fleet. A wider project to enhance the type's performance and safety is also being studied.

Last year, Kuala Lumpur also signed a letter of acceptance with Airoad about a long-delayed cockpit upgrade for Malaysia's C-130 fleet. This will see the ageing transports receive modern glass cockpits, improved avionics and up-to-date navigation systems.

Although LIMA will offer a glimpse of the future of Malaysian airpower, May's release of the government's 11th Malaysia plan could give far more clarity about defence funding priorities in the five years to 2020.

The plan will touch on all aspects of the economy, however, and in all likelihood defence will receive only a modest mention. That said, the nation's navy has requested that funding for six shipborne anti-submarine warfare helicopters be included. The plan will also be scrutinised for details about other requirements, such as MRCA, maritime patrol and AEW&C. ■

AIRLINES

In it for the long haul

AirAsia X's new chief faces an uphill task to turn its fortunes around and seek profitability that has so far eluded the carrier

AARON CHONG SINGAPORE

Big changes appear to be underway for Malaysian long-haul, low-cost carrier AirAsia X (AAX), following the abrupt departure of chief executive Azran Osman-Rani in January.

AAX subsequently appointed Kamarudin Meranun to the newly created role of chief executive of the AAX Group, which encompasses AAX, Thai AAX and Indonesia AAX.

At the same time, AAX announced a proposed rights issue that should raise up to MYR395 million (\$108 million) to repay borrowings and to fund its working capital.

The rights issue is seen as a reaction to the consecutive losses in the last three quarters, as the airline boosted capacity at the expense of yields. AAX had reported an operating loss of MYR308 million for the first nine months of 2014, and a net loss of MYR351 million.

In a previous interview with Flightglobal, Azran said some of the airline's "earning pressures are a result of [their] own doing, as it pays for growth", and it is "deliberate with [its] IPO strategy that money raised will fund growth".

It appears, however, that AAX's shareholders may have lost patience with the strategy of taking hits now with an eye to the long-term. The company's stock has fallen about 40% in the last 12 months, and the long-haul, low-cost business model has some way to go before being accepted as a viable way of running a carrier.

Shukor Yusof, founder of aviation advisory firm Endau Analytics, questions whether Azran is solely to blame for AAX's current straits. "The business model [of building scale] was crafted by the senior management of the group and any shortcomings need to be addressed accordingly," he says. "[But] as chief executive, the buck understandably stops with [Azran]," he adds.

Concerns about mounting losses are starkly evidenced by its cutting of destinations and delaying of aircraft deliveries. Although AAX will still fly to 19 destinations, it recently cut Kuala Lumpur-Nagoya and will be removing the Kuala Lumpur-Adelaide service.

In addition, AAX will take delivery of only four Airbus A330s in 2016 instead of the planned eight, with the remaining four aircraft converted to A330neos for delivery from 2018 onwards. Similarly, it will take delivery of five aircraft in 2017, with three to be converted to A330neos for delivery after 2018.

More pertinently, the reduction of aircraft deliveries indicates that the airline is finally tweaking its expectations and wants to execute its growth strategy less aggressively.

TURNAROUND NEEDED

As for incoming boss Kamarudin, Michael Hui, aviation analyst at Flightglobal's Ascend consultancy, says the former's role will be to help implement a turnaround plan for AAX. Kamarudin's remit, Hui feels, will be strengthening its balance sheet and to maximise profitability, and ensuring a stronger financial footing for the company.

Yusof, however, says that there is no guarantee Kamarudin can make the company profitable "unless he finds the magic potion that has so far eluded many who tried to go long-haul, low-cost".

"[AAX] was premised on the belief that there will be sufficient demand for traffic in the long-haul, low-cost market. As we have

seen, it isn't easy to achieve success with this model."

That said, Yusof feels that Kamarudin "brings a steady hand and an in-depth understanding of the markets". And as co-founder of AirAsia, Kamarudin's taking of the reins "instills confidence to the company's creditors and investors – or so the group hopes".

On the formation of the new AAX Group, Yusof says that this new strategy "will allow senior management to see at a glance how each unit is performing vis-à-vis their competitors, and brings cohesiveness and a streamlining of revenue flow". One potential issue of this set up, he feels, is that the "weakness of one subsidiary could drag the others down".

"Others have benefited from AAX's folly of mass expansion and over-exuberance"

SHUKOR YUSOF

Founder, Endau Analytics

Hui also believes the new AAX Group will be a positive restart for the airline. "It is definitely beneficial for AAX to group all its over overseas affiliates under one ambit to strengthen its Southeast Asia market."

"This is the right direction for AAX to be heading, in order to build stronger networks within Southeast Asia, as it lacks interline partnership with other airlines," adds Hui.

He cites AAX's regional low-cost rivals Citilink and NokScoot of Indonesia and Thailand, respectively, as carriers that have networking partnerships with their parent companies in such countries.

Yusof adds: "Obviously [other low-cost airlines] have benefited from AAX's folly of mass expansion and over-exuberance. But the low-cost, long-haul market is extremely hard to crack. I'd say the odds are 50:50." ■



Amid mounting losses, the carrier has cut back on routes and will only take delivery of four A330 aircraft in 2016, down from eight



FAR AND AWAY

With its impressive range, sumptuous accommodation and fly-by-wire controls, Gulfstream's G650ER pushes the boundaries in the ultra-long-range segment

MICHAEL GERZANICS SAVANNAH

It has been over 10 years since I flew a large-cabin Gulfstream, when I was awed by the G550's ability to fly eight passengers in comfort over 6,750nm (12,500km). With the clean-sheet G650, Gulfstream has advanced the state of the art in several areas. Since it received US Federal Aviation Administration certification in September 2012, over 100 examples of the large-cabin ultra-long-range twinjet have been delivered. The G650ER is an enhanced-range version of the G650, offering sumptuous accommodation and a 500nm range increase. When *Flight International* was offered an opportunity to fly the G650ER, I was excited to see just how far Gulfstream had raised the bar over the last decade.

RANGE

With a range of 7,000nm at Mach 0.85, the G650 advanced the marker for business jets carrying eight passengers in its large cabin. Already the most capable large-cabin business jet, one important city pairing exceeded its grasp, however: New York to Hong Kong. Within the existing wing profile Gulfstream found space for 9% more fuel. The additional 1,810kg (4,000lb) of fuel is accommodated by changes

to the existing fuel system, fuel monitoring system and flight management system (FMS) software. Gulfstream also increased maximum take-off weight by 1,810kg, increasing range and payload flexibility. With eight passengers, the G650ER's 500nm range improvement makes New York-Hong Kong possible (Gulfstream reported a distance of just shy of 7,500nm with 85% Boeing-standard winds and IFR reserves). On a shorter 7,000nm leg the G650ER can fly faster – shaving 30min off the sortie – or carry 910kg of additional payload.

While the G650ER's range improvement is certainly noteworthy, it would be foolish to let it totally eclipse the capabilities and comforts the G650 has brought to its operators. The G650's fuselage has an ovoid cross-section that maximises usable interior volume while reducing wetted area and drag. Cabin height and width, compared to Gulfstream's former standard-bearer the G550, are increased by 7.6cm (3in) to 196cm and by 136cm to 259cm respectively. The cabin has also been lengthened by about 1m, increasing volume to 60.5m³, a 28% increase.

Gulfstream offers a large number and variety of interior configurations to suit its customer's varied needs. According to Lor Izzard, director of sales support and technical marketing, the

G650 cabin has four living areas, each approximately 2.7m long. For ultra-long-haul operators, the forward area can be configured as a crew area with its own lavatory, ensuring privacy for passengers as well as a well-rested crew. Regardless of the configuration chosen, cabin ambient lighting is enhanced by 16 trademark Gulfstream oval windows. Each is 16% larger than those found on the G550 and they run the full length of the cabin.

FLIGHTDECK

Unlike a chauffeured Rolls-Royce, the R-R-powered G650 does not coddle its passengers at the expense of the drivers. The G650 comes equipped with Gulfstream's impressive PlaneView II flightdeck. Based on Honeywell's Primus Epic avionics, the PlaneView II system features four large (14.2in) LCD displays and two standby multifunction controllers (SMFCs) with 5in displays. In addition to their control functions, the displays also act as standby instrument cluster/primary flight display (PFD). Other standout features are an LCD head-up display, enhanced vision system (EVS) and synthetic vision PFD (SV-PFD). The G650's cockpit is paperless, with JeppView charts and an electronic checklist (ECL). Each G650 comes with three Plane-



Gulfstream has boosted the range on the ER version of its G650 twinjet to 7,500nm

Book subscriptions, which presents the Quick Reference Handbook (QRH) and other flight-related publications on an iPad.

Impressive as the flightdeck is, the biggest change is most likely to go unnoticed by the passengers – and perhaps even the pilots. In a first for Gulfstream, the G650 has a fly-by-wire (FBW) flight control system. Gulfstream has retained a conventional yoke for its first FBW aircraft, as had Boeing when it fielded the 777.

The G650's quadruplex digital system has three flight control computers (two primary and one backup FCC) and controls all three axes. Each primary flight control surface has two hydraulic actuators, powered by the aircraft's left and right hydraulic systems, as well as an electrical backup hydraulic actuator (EBHA). The EBHAs incorporate a self-contained hydraulic source and require only electrical power to operate. Dedicated batteries for the EBHAs and FCCs are

installed. A ram air turbine (RAT) is fitted to charge the batteries in the event all engine and APU-driven generators fail.

FLY-BY-WIRE

Both the G650 and Boeing 777 have conventional yokes, while FBW Airbus and Embraer aircraft have sidesticks. Which manual interface is preferable – yoke or sidestick – is still a debated topic. The desire for a common type rating with the 777 is likely to have been the deciding factor in Boeing putting a yoke in the 787. Gulfstream's selection of a yoke for the G650 may well have been to increase commonality with its other large-cabin offerings, the G550 and G450. Gulfstream will use active sidesticks in their G500/G600 aircraft, which should be an improvement over current passive sidesticks.

What type of controller the pilot manipulates is only part of the equation, because behind the curtain are the all-important flight control schemes. Each manufacturer has developed its own flight control laws (FCLs). Broadly speaking, roll control laws have settled into either a roll rate command system or proportional deflection of the roll control surfaces. For "yaw" control most schemes have the rudder pedals commanding sideslip angle (beta).



The G650ER's cabin is Gulfstream's tallest, widest and longest – and remarkably quiet

» Where there is a good amount of discussion is whether the roll and yaw axis should be coupled or uncoupled. In a conventional aircraft, sideslip usually generates a roll in the direction of the rudder pedal input, termed roll due to yaw. FBW control schemes can decouple these axes, rudder displacement commanding a pure wings-level sideslip.

Control schemes in the pitch axis are seemingly unique to each manufacturer. For the sake of brevity, pitch FCL descriptions below are for the up-and-away flight conditions. Airbus employs a C* scheme: pitch rate command at slower speed transitioning to G command at high speed. Boeing uses C* U: similar to Airbus but with the “U” representing apparent speed stability, which provides the kind of response to a speed change that a pilot would expect to see in a conventionally controlled aircraft. Embraer has elected to use a pitch rate command system throughout the speed range. One reason pure G command schemes have not found greater use is that they can be overly sensitive at slower airspeeds.

For the G650, Gulfstream has developed its own unique set of FCLs. The normal FBW flight controls have two modes: take-off and landing (TOL); and up and away. Extending either the landing gear or flaps puts it into the TOL mode. In the up and away mode, the G650 Gulfstream’s pitch control scheme is a G command with apparent speed stability. In TOL it is proportional control with a Qbar (dynamic pressure input) to normalise aircraft response. In roll the flight control laws are the same for both TOL and up and away modes. Based on proportional control with a Qbar modifier, the FCL is designed to provide a linear progression in roll rate for given yoke displacement, regardless of speed. Relative aileron and spoiler deflections are mixed to provide consistent roll

rates. As with roll, yaw FCLs are the same for both TOL and up and away. Rudder pedal inputs command rudder deflection, which in essence commands yaw rate (beta dot). There is a Qbar-based gains schedule to provide uniform aircraft response over its speed range. The G650’s roll and yaw axes are coupled, rudder input causing a corresponding roll response.

PROTECTIONS

For most business/transport aircraft, the most demanding tasks occur in the take-off and landing phases of flight. While highly unlikely, an engine failure on take-off can be a life-defining moment. Both Airbus and Boeing have tailored their FCLs to mitigate risks and reduce pilot workload during an engine-loss event. A FBW Airbus will initially act like a conventionally controlled aircraft, allowing limited wing-drop on the dead engine side and limited yaw in that direction, allowing the pilots to see and feel the asymmetry, hopefully reacting by correcting it with rudder input. In Boeing’s 777 and 787, the thrust asymmetry compensation systems (TACS) render most engine-failure events feet-on-the-floor non-events. As detailed above, the G650’s FCLs in TOL are essentially digitised conventional controls, with yoke and pedal displacement commanding proportionate surface deflection. While the G650’s rudder does have low-to-moderate forces, Gulfstream has elected not to offer any enhanced features to mitigate risk during an engine failure. For landings, a stabilised ILS approach is about as easy as it gets. A sidestep or circling manoeuvre during an approach at night to minimums, however, can be an order of magnitude more difficult. While sidestep and circling manoeuvres were not evaluated during my preview flight, the proportional control nature of the G650’s FCLs in the TOL

mode should ensure it handles as well as the G550, with the benefit of lower control forces.

Of course FBW flight controls offer the opportunity to provide other automatic envelope protections. Airbus has embraced this philosophy more than any other manufacturer. Boeing has also incorporated envelope protection features, but to a lesser degree than Airbus. With the G650 Gulfstream has adopted an even more minimalistic approach than Boeing. In pitch all three manufacturers provide both high- and low-speed protections. Airbus has again gone the furthest, limiting G as well as maximum pitch and dive angles. Both Airbus and Boeing provide some envelope protections in roll. In line with their envelope protection philosophy, Airbus limits the maximum angle of bank, while Boeing has a soft stop at 35° of roll, which can be overridden with more yoke force. Gulfstream has elected to forego restrictions in roll entirely.

SORTIE

The G650ER is the world’s longest-range business jet, and until recently was also the fastest. As I detailed in my Citation X+ flight test report (*Flight International*, 21-27 October 2014), the G650 had been pipped at the post by a mere one-hundredth of a Mach number. Other than having nearly identical top speeds, these are aircraft designed for markedly different missions. I was intrigued to see at first hand how Gulfstream’s class-leading ultra-long-range, large-cabin FBW speedster would handle. Tom Horne, Gulfstream’s senior test pilot, would guide me as we put the G650 through its paces. Horne and I had both been F-16 experimental test pilots at Edwards AFB prior to our civilian careers. Our shared background and prior G550 preview flight together instantly put me at ease.

During the preflight walk-around I could not help but notice how big the G650ER is with its 30.36m wingspan. In a first for the company, Gulfstream uses a bonding process to fabricate the fuselage, and with 80% fewer fasteners than the G550 it looked remarkably smooth. The large main entry door has two passive seals, using gravity for extension with electrical retraction. As mentioned above, the G605’s cabin is large – the largest ever offered by Gulfstream. Our preview aircraft, N650ER, was a production-representative demonstrator. The cabin was configured with a forward crew area, the three other plush living areas being dedicated to the passengers.

Entry into the PlaneView II flightdeck was facilitated by the smaller centre pedestal, compared to the G550. Once seated, I adjusted my seating position by reference to the eye alignment balls on the centre windshield pillar. Next, I lowered the head up display (HUD) to ensure I could easily read it without moving my head. The conventional yoke was similar



Gulfstream’s PlaneView II flightdeck on the twinjet features four large LCD displays



The aircraft has a 30.36m wingspan

in design to that on the G550, but not as wide. Horne said the FBW architecture gave lower roll control forces, allowing for narrower horns. The large, silver thrust levers were bracketed by two of the MCDUs and fell readily to hand. Each pilot's F-16-esque cursor control device (CCD) was mounted on the outboard sidewall. Overall, the flightdeck's layout was exceptionally clean and well thought-out.

The G650ER is the world's longest-range business jet, and until recently was also the fastest

Prior to engine start, Horne guided me through initialisation of the flight management system. I found the PlaneView II's interface to be quite intuitive, with the CCD allowing for easy navigation through the various displays and pull-down menus. Horne ran the pre-start flows, checking each item off in the electronic checklist. Both engines were started using bleed air from the APU. Post-start checks were brief, and once cleared by the ground crew I released the parking brake by lowering its pedestal-mounted large, silver hand lever. Residual thrust from the R-R engines was enough to start the G650 rolling.

During the taxi to runway 10, I found the FBW nose-wheel steering and brakes allowed me to easily track taxiway centrelines and control speed. The G650 has three external-view cameras, whose feeds can be displayed on an MFD. I found the belly-mounted ones allowed me to see if I was dead on centreline. On especially narrow taxiway junctions it also lets you monitor where the main gear are tracking, so you avoid dragging a main mount in the weeds. In the big picture, having ownership position presented on the MFD's airfield diagram allowed me to easily keep track of our position, and the Honeywell runway awareness and advisory system (RAAS) great-

ly reduced the chances of my wandering onto an active runway.

As we taxied onto runway 10, I checked that the flaps were set to T/O APP (20°). Take-off reference speeds for the 30,930kg aircraft (6,300kg fuel) were 110, 111 and 120kt (220km/h) indicated airspeed for V1, VR and V2, respectively. Once cleared for take-off, I advanced the thrust levers. The auto throttles (ATs) engaged and set an engine pressure ratio of 1.59, which briskly accelerated the G650ER down the runway. Pitch control forces were light at VR and I was easily able to capture the initial climb attitude of 10°. Pitch force changes for gear and flap retraction and during acceleration to the initial climb speed of 200kt were small and easily trimmed off. Out of the airport traffic area a climb speed of 250kt was held as we received vectors to our working area over the Atlantic. Passing 10,000ft I lowered the nose to capture 320kt, which was held until M0.82 was captured. From brake release, time to level off at FL490 was approximately 29min and required

1,090kg of gas. At maximum take-off weight the G650ER can climb directly to 41,000ft. Our test-day fuel and crew loading would have allowed us to climb directly to 51,000ft.

PERFORMANCE

Once level at 49,000ft, the aircraft accelerated at climb power (1.74 EPR) until it reached M0.85, long-range cruise speed. A total fuel flow of 2,300lb/h held an indicated airspeed of 211kt, and at a static air temperature of -66°C (-87°F) gave a true airspeed of 478kt. Next, I bumped the power up and set a total fuel flow of 2880lb/h. After a slow acceleration the aircraft settled at M0.90, high-speed cruise. Resultant true airspeed was 504kt. These test day results lend credence to the G650ER's published (and demonstrated) range and speed capabilities. They are even more remarkable when compared to the G550. At first impression both aircraft should have similar performance. The ER's wing loading at MTOW is 392kg/m², nearly identical to the G550's. Fuel fraction at MTOW is 46.5%, only slightly higher than the G550's 45.4%. Yet the G650ER has nearly 10% greater range at its M0.85 LRC speed than does the G550 at its M0.80 LRC speed. With both aircraft holding M0.85, the G650ER's advantage is 1,500nm, a 25% increase. The G650ER's new BR725 engines are 3-4% more efficient than the G550's BR710's, which is not enough to explain the difference. Quite simply, the G650ER is a more aerodynamic aircraft. Its advanced supercritical wing is more swept than the G550's, with more refined winglets that further reduce drag. These aerodynamic improvements explain why one of two nearly identical aircraft, from a parametric standpoint, has much better cruise performance.

Not only does the G650ER go farther and faster than the G550, but also its passengers are treated to an even nicer cabin environment. As mentioned earlier, the G650ER's cabin is Gulfstream's tallest, widest and longest. Level at 49,000ft I left the flightdeck to sample the cabin environment. Gulfstream's parent company General Dynamics also has an electric boat division, and while quietness is important for a business jet, it is essential for a submarine. Gulfstream's Izzard would not quote specifics, but the G650's ambient noise level was one of the quietest I had experienced. Like a quieter cabin, a lower cabin altitude is also shown to be less fatiguing. The G650 has a 10.69Δp pressurisation system, and observed cabin altitude was just 4,620ft. At 51,000ft, published cabin altitude is only 4,850ft. As I returned to the flightdeck I reflected that the G650's low cabin altitude and larger and quieter cabin shows good things do come in threes.

While still at altitude at M0.90, I did a series of 45° and 60° angle of bank (AoB) rolls. No buffet was felt at 45°, but rolling to and capturing 60° AoB induced some airframe buffet. Yoke



The G650ER is an enhanced version of Gulfstream's G650

» forces were, by design, linear and only 15kg of pull was required to hold a 2g (60°) turn. I found the G650's roll response to be crisp, allowing me to easily capture desired AoBs. Impressed with the G650's high-altitude handling qualities, I next initiated a high-speed, idle-power descent, reflective of that needed in the event of a cabin depressurisation. Once established at M0.90, I extended the speed brakes. Their extension caused a slight pitch-up, requiring about 2kg of yoke pressure to counter. The descent rate stabilized at 9,900ft/min, a healthy rate that would enable the G650 to get to lower altitudes quickly. I next increased forward yoke pressure, accelerating to M0.925 and into the red band on the PFD's airspeed tape (MMO). A "HIGH SPEED PROTECTION ACTIVE" message from the engine-indication and crew-alerting system (EICAS) alerted me that the FBW protections had kicked in. Additional forward yoke pressure had no effect: the G650 could not be over-spiced.

The G650's low cabin altitude and larger and quieter cabin shows that good things do come in threes

Approaching 15,000ft, I retracted the speed brakes and slowed the G650 for two approach-to-stall manoeuvres. Horne said these would demonstrate the low-speed protection offered by the FBW control system. At idle power in a clean configuration the aircraft slowed at about 1kt/s. The stick shaker went off at an indicated airspeed of 127kt, a normalised AoA of 0.93. Full aft yoke pressure slowed the aircraft slightly and AoA increased to and stabilised at 0.94 AoA. The aircraft settled into a rock-steady wings-level descent. At this elevated AoA the aircraft was responsive to small control inputs in all three axes. Recovery to normal flight was accomplished by relaxing yoke back pressure and advancing the thrust to mid range. The next

approach to stall was in a landing configuration, gear down and flaps down (39°). Slowing again at about 1kt/s, the shaker activated at 98kt. Full aft yoke again caused the G650 to enter a stable wings-level 0.94 AoA descent. Advancing the power and lowering the nose recovered the G650 to normal flight conditions. The gear and flaps were retracted as we accelerated and turned towards home.

VISION

Our recovery to Savannah was via vectors to an ILS approach, where light winds allowed us to use runway 01. I hand-flew the approach, following the flight director's guidance cues in the HUD. While we were in clear daylight conditions, I turned on the EVS system, which presented its infrared imagery in the HUD. EVS imagery precisely overlaid actual terrain features. The EVS's IR window is mounted on the top of the G650's radome, and I could discern little parallax error as we descended to the runway. At 350ft above the runway, the runway brackets closed in to accurately mark the runway's edges. At 100ft above the runway I advanced the power to TO (1.60 EPR) and abandoned the approach. With the gear retracted, and flaps at T/O APP, Horne rapidly pulled the right thrust lever to IDLE, to simulate an engine loss at V2. As the nose yawed right I put in a moderate amount of left rudder. Only about 12kg of force was needed to arrest the yawing, and keep us tracking down the extended centreline. While I favour systems like the 777's TACS, the G650's low pedal forces and precise yaw control made the simulated V2 cut manoeuvre easy to manage.



The G650ER is a more aerodynamic aircraft than the G550, contributing to a much better cruise performance

Gulfstream

Once reaching pattern altitude Horne gave the right engine back to fly our last approach, a GPS guided area navigation approach to runway 10. The approach, flown with GPS guidance in both lateral and vertical planes, had a LPV (localiser performance with vertical guidance) decision altitude of 230ft MSL, 200ft above the TDZ (touch-down zone). With credit for the EVS, approach minimums were only 100ft above TDZ, equal to a typical ILS CAT II. I engaged the autopilot and autothrust for the approach. With the target speed of 139kt being held by the AT, the G650 smoothly tracked both the lateral and vertical paths. Passing about 200ft AGL I disconnected the AP and hand-flew the remainder of the approach. Passing 50ft AGL I clicked off the ATs and slowly retarded the thrust levers to IDLE. On touchdown I lowered the nose wheels to the runway and selected reverse thrust. Speed brakes and ground roll spoilers automatically deployed and moderate toe braking quickly slowed the G650ER for runway turn-off. The short taxi to Gulfstream's ramp was uneventful, with shutdown and post shutdown procedures easily accomplished.

DESIGN

The 2h preview flight in the G650ER allowed me to gain valuable insights into the world's premier large-cabin, ultra-long-range business jet. While only a decade separates them, the G650 and its longer range ER variant are heads and shoulders above their G550 predecessor. The aircraft's enhanced capabilities are primarily the result of a new highly refined supercritical wing. Upfront, the PlaneView II flightdeck is even more capable, sporting a standard EVS that will allow arrival at many smaller airports in the most demanding weather conditions. What may go unnoticed by the passengers and even some pilots is the FBW control system. Pitch, roll and yaw responses are largely normalised across the flight envelope, providing precise handling qualities throughout. The FBW control scheme provides envelope protection at high and low speeds, without further restrictions. Overall I found the G650ER was a joy to fly, with control forces lower than those in the G550. No one will buy a G650/G650ER because it has a FBW flight control system. This pilot, however, found the G650ER handled like an aircraft should, a great reflection of the utility and refinement Gulfstream has built into it. ■



In a first for the company, Gulfstream uses a bonding process to fabricate the fuselage

Gulfstream

From yuckspeak to tales of yore, send your offcuts to murdo.morrison@flightglobal.com

Planespotters jailed in emirate

An hour's drive from Dubai International, sleepy Fujairah airport on the UAE's east coast could not be more different to the teeming 24/7 global hub. It's a great place to spot Russian freighters and the odd royal business jet. There's a graveyard packed with half-dismantled Ilyushins and Antonovs.

But beware, if you plan to go there armed with camera and notebook, after the arrest and jailing last week of three British planespotters on suspicion of breaching national security.

The incident has echoes of the 2001 trial in Greece of British aviation enthusiasts who took pictures at an air base.

With no word of their release as we went to press, it remains to be seen if the Emiratis – so keen to project the UAE as the emerging aviation capital of the world – will see sense over what has been a harmless pastime since the industry began.

Only way is up

Names suited to jobs #124. The strategic marketing manager at Airbus who assured us modest sales of the A380 would gather pace once more superjumbos are in service is... Simon Pickup.

Good riddance

Our man in Oz came across this somewhat blunt media statement (*right*) from a former Labor



An An-72 freighter at Fujairah airport, but don't look too closely – you might get arrested

transport minister, issued after Sydney airport chairman Max Moore-Wilton announced his resignation. Both men regularly locked horns, and Moore-Wilton is former chief of staff for Liberal PM John Howard, so there's little love lost between the pair.

Remote access

A year from now, one of the world's most isolated islands will have its first air link. St Helena in the south Atlantic, a UK outpost where Napoleon was exiled for six years to his death after defeat at Waterloo, is building an airport. Today, the only way to the British Overseas Territory, almost 2,000km off the African coast, is a five-day sea crossing from Cape Town.



Atlantic Star Airlines – founded by three British Airways pilots – expects to learn in days whether its bid for the air access contract, operating a Boeing 757-200 wet-leased from Icelandair, has been successful.

Branching out

Baffled by the size and complexity of the F-35 production effort? Well thankfully the folks at Lockheed Martin aren't – so long as this analogy about buying smaller aluminium blocks to be machined into bulkheads makes perfect sense to everyone: "When you build a house, you don't go out and buy a tree, you buy two-by-fours. That's what we're doing. We were buying the tree and we went down to the exact bulkhead we need."

Just to be certain: the F-35 does not actually use any wooden structures.

Self-starters

With the gradual tendency exhibited in modern practice towards the development of larger and more powerful

100 YEARS AGO

aeroplanes, the desirability of providing some mechanical device which will enable the pilot to start the engine, without outside assistance, becomes increasingly evident.

Flamingo focus

From the remarks made during Mr AS Butler's speech at the

75 YEARS AGO

annual general meeting recently, it was obvious that De Havilland

Aircraft, does not intend to let its commercial business die during the war. Already the firm has announced an improved version of the Flamingo.

Lightnings strike

The parliamentary secretary to the Ministry of Aviation, Mr

50 YEARS AGO

John Stonehouse, said that the forthcoming sonic-boom

demonstration for Members of Parliament and representatives of local authority associations would be made by Lightning aircraft flying between 25,000ft and 34,000ft.

Shorter stick-time

European airlines are preparing for a lengthy

25 YEARS AGO

political battle to water down European Commission

proposed legislation on aircrew flight times. Draft proposals would limit "stick-time" to 8h a day, 72h per 28 days, 200h a quarter and 720h a year.



100-YEAR ARCHIVE

Every issue of *Flight* from 1909 onwards

can be viewed online at flightglobal.com/archive



Mais, ze cruise brochure said relaxing sea voyage there, back by air...

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Reporting fuels misconceptions

I'd just finished writing an editorial criticising the mass media for incorrect reporting of the Cirrus ditching when – lo and behold – my 3-9 February issue of *Flight International* turns up with the same basic error, complete with wisecrack about “there not being too many FBOs in the Pacific Ocean”.

The Cirrus – which was bound for Australia and the Avalon Air Show – did not run out of fuel. It was starvation, not exhaustion.

The transfer pump from the ferry tank failed and the pilot used the time he had left – with the fuel remaining in the standard tanks – unsuccessfully trying to solve the problem, alerting the authorities and flying to the relative safety of the cruise ship.

He then configured the aircraft for CAPS deployment, shut down the engine, deployed CAPS and floated gently into the sea. Textbook....

Just wanted to set the record straight.

Stewart Wilson

Editor, AERO Australia magazine
Bungendore, Australia

CABIN CONTAMINATION

Toxic problem ignored too long

The Independent Pilots Association (IPA) has been at the forefront of worldwide efforts to promote research into the problem of ‘aero toxicity’, a problem that is known to exist but one that has been widely ignored by the aviation industry for far too long.

Contamination of cabin air occurs when oil burns inside the combustion chamber of aircraft engines and then enters the cabin through faulty seals on the air feed systems that operate directly from the engine. The only aircraft that does not use such a system to pressurise cabin air is the Boeing 787 Dreamliner.

Current research provides credible evidence that the burning of this oil produces carcinogenic substances which can cause neurological damage. At low levels, repeated exposure to these substances is known to be dangerous.

At higher levels, even a single exposure could incapacitate the crew and passengers of an aircraft. The lack of investment into research about the problem is a particular concern but there are powerful economic forces that prevail to prevent proper investment into researching this problem.

While ill health is most likely to affect only frequent flyers, there are risks to everyone from this problem. The IPA is regularly contacted by pilots who believe they have been exposed to a fume event.

The Global Cabin Air Quality Executive (GCAQE), of which the IPA was a founding member, is believed to be the only body worldwide whose sole purpose is to investigate, research and report on this problem. The IPA is also the only trade union for pilots actively examining this problem.

Currently, the only known solution to this problem is for cabin air to be pressurised using an independent electrical system rather than using engine bleed air. With an ageing fleet of aircraft around the world, the risk factors increase. The industry needs to face up to this problem before more people – whether they be crew or passengers – are harmed by being exposed to toxic cabin air or, worse still, some catastrophic event occurs.

Philip Flower

General secretary, The Independent Pilots Association
Haywards Heath, UK

Crew there to fly

Having subscribed to *Flight International* for over 40 years, simply because of an interest in all things aviation – beginning in 1975 when I bought copies from the local newsagent, then on to a print subscription in the 1980s, and then a digital subscription in 2013 here in Australia – I thought it might be a good idea to make

known my simple observation on aviation safety.

The crew are there to fly the aircraft; computers assist the pilots. If the pilot or co-pilot cannot read the basic back-up instruments showing the speed and attitude in relation to the plane's capabilities, then leave and get a job in IT. If you are a co-pilot and see a discrepancy then bring it to the pilot's atten-



Rex Features

Clark: selling superior service?

tion before it is too late. Stuff the rank and pecking order.

Jeff Edwards

By email

Gulf between US

I write in support of Tim Clark of Emirates (*Flight International* 10-16 February).

I will keep this simple. The world does not owe US legacy carriers a living. Passengers are not forced to fly the Gulf carriers. Passengers choose them because they provide a superior service and with aircraft that are more comfortable. I will unashamedly say I will always choose Emirates over Delta/United etc, partly because they operate the Airbus A380. Emirates' economy service leaves US legacy carriers standing. Richard Anderson: you have your answer from me and I dare say many other passengers.

Rev Craig P Smith

Diocese of Waiapu
Waipukurau, New Zealand

To -er is human

In response to the letter from Arthur Nilssen [*Flight International*, 13-19 January], airframer, picture framer, wrangler, upholsterer, peeler; there are plenty of precedents for -er added to a verb to describe the person that does it.

Besides, language evolves.

Carl Brancher

Abergavenny, Wales



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20-21 April

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isconference.com

20-23 April

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24 April

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29-30 April

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Atlanta, USA
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4-7 May

AUVSI's Unmanned Systems
Atlanta, USA
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10-11 May

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13-14 May

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17-20 May

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19-21 May

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26-28 May

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31 May - 3 June

1st International Symposium on Sustainable Aviation (ISSA)
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issasci.org

4-6 June

France Air Expo
Lyon-Bron airport, France
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15-21 June

Paris Air Show
Le Bourget, Paris
siae.fr

17-19 July

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Ref: DACPM/737-800/154/2015/1456 Date: 19 February 2015

Request for Proposal (RFP) for dry lease of one 737-800 aircraft

- Biman Bangladesh Airlines Ltd. invites Proposal/Offer for taking of 01 (one) 737-800 aircraft for a period of 60 (sixty) months on dry lease basis. Airlines, Operators, Owners of Aircraft, Manufacturers, Leasing Companies having aircraft of its own or legally authorized by the owner may participate in the RFP complying with the terms & conditions given in the RFP Schedule. Basic requirements are mentioned below:

a. Number and Type of Aircraft	01 (one) 737-800 aircraft.
b. Seat Configuration	Two class configuration with 162 (12J+150Y) seats. All seats shall have to be in good condition.
c. Age of the Aircraft	The aircraft should not be more than 10 years of age as on closing date of RFP.
d. Nature and period of Lease	Dry Lease for a period of 60 (sixty) months.
e. Commencement of Lease	July 2015.
f. Representation & Authorization	If the Bidder/Lessor is not the owner of the aircraft, then owner's authorization/ mandate must be submitted prior to negotiation.

- Detailed information is available in the RFP Schedule. RFP Notice and Schedule may be viewed at Biman's website: www.biman-airlines.com.
- The Proposal/Offer may be submitted to the General Manager (Corporate Planning) at E-mail: dacpm154@bdbiman.com by 1000 hours LT (0400 hrs UTC) on 16 March 2015. Proposal/Offer may also be submitted through Courier Service or dropped in the Box placed in the Office of the General Manager (Corporate Planning), Biman Head Office, Balaka, Kurmitola, Dhaka-1229 within the stipulated time. The Proposal(s)/Offer(s) will be opened immediately after the closing time in presence of the Bidder(s), if any. No Proposal/Offer would be accepted after the closing time. Biman Bangladesh Airlines Ltd. will not be responsible for late receipt of Proposal/Offer due to any reason, whatsoever.
- For further information or query, General Manager (Corporate Planning) may be contacted at Telephone: +880-2-8901600/Extension-2415, +880-2-8901697 (direct), Fax: +880-2-8901396, E-mail: gmp@bdbiman.com during the office hours.
- Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all the Proposals/Offer at any time and/or stage without assigning any reason, whatsoever, and no claim will be entertained in this regard.

Mohd. Abdur Rahman Faruky
General Manager Corporate Planning (Acting)



HEAD OFFICE, BALAKA, KURMITOLA, DHAKA-1229, BANGLADESH
PHONE: 8901600-14, 8901680-94, FAX: 88-02-8901558, www.biman-airlines.com
Ref: DACPM/777-200ER/153/2015/1455 Date: 19 February 2015

Request for Proposal (RFP) for Dry Lease of one 777-200ER Aircraft

- Biman Bangladesh Airlines Ltd. invites offers/proposals for Dry Lease of 01 (one) 777-200ER aircraft for a period of 60 (sixty) months. Airlines, Operators, Owners of Aircraft, Manufacturers, Leasing Companies having aircraft of its own or legally authorized by the owner to submit the offer, may participate in the RFP complying with the terms & conditions stated in the RFP schedule. Basic requirements are mentioned below:

i. Number and Type of Aircraft	01 (one) 777-200ER aircraft powered by PW4090 engine
ii. Nature & Period of Lease	Dry Lease for 60 (sixty) months.
iii. Configuration	Two class standard configuration not less than 319 seats. All seats shall have to be in good condition.
iv. Age of the Aircraft	The aircraft should not be more than 10 years of age as on closing date of RFP.
v. Authorization	If the Lessor is not owner of the aircraft, owner's authorization/mandate must be submitted prior to negotiation
vi. Commencement of Lease	July 2015

- Detailed terms and conditions have been given in the RFP schedule. RFP notice and schedule may be viewed in Biman's web-site: www.biman-airlines.com.
- The Offers/Proposals are to be submitted latest by 1000 hours LT (0400 hrs UTC) 15 March 2015 addressed to General Manager (Corporate Planning), Biman Bangladesh Airlines Ltd., Head Office, Balaka, Dhaka, Bangladesh through E-mail at dacpm153@bdbiman.com. Proposals/offers may also be submitted through courier service or dropped in the Tender Box placed in the office of General Manager (Corporate Planning), Biman Head Office, Balaka, Kurmitola, Dhaka-1229. No offer/proposal will be accepted after the closing time and date.
- For further information or query, General Manager (Corporate Planning) may be contacted at Telephone: +880-2-8901600/Extension-2415, +880-2-8901697 (direct), Fax: +880-2-8901396, E-mail: gmp@bdbiman.com during the office hours.
- Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all the offers/proposals partly or wholly without assigning any reason whatsoever and no claim shall be entertained in this regard.

Mohd. Abdur Rahman Faruky
General Manager Corporate Planning (Acting)



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We are issuing a Corrigendum to the RFP for Global Tender mentioned above. The same is being uploaded on NRSC website. The last date for submission of the bids is extended from 16.02.2015 to 16.04.2015.

Full details and further updates can be downloaded from NRSC website (<http://www.nrsc.gov.in/>) and ISRO website (<http://www.isro.gov.in/>).

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PHONE: 8901600-14, 8901680-94, FAX: 88-02-8901558, www.biman-airlines.com
Ref: DACPM/777-300ER/155/2015/1461 Date: 24 February 2015

Request for Proposal (RFP) for Dry Lease of one 777-300ER Aircraft

- Biman Bangladesh Airlines Ltd. invites offers/proposals for Dry Lease of 01 (one) 777-300ER aircraft for a period of 60 (sixty) months. Airlines, Operators, Owners of Aircraft, Manufacturers, Leasing Companies having aircraft of its own or legally authorized by the owner to submit the offer, may participate in the RFP complying with the terms & conditions stated in the RFP schedule. Basic requirements are mentioned below:

i. Number and Type of Aircraft	01 (one) 777-300ER aircraft.
ii. Nature & Period of Lease	Dry Lease for 60 (sixty) months.
iii. Configuration	Two class configuration not less than 419 seats. All seats shall have to be in good condition.
iv. Age of the Aircraft	The aircraft should not be more than 10 years of age as on closing date of RFP.
v. Authorization	If the lessor is not the owner of the aircraft, owner's authorization/mandate must be submitted prior to negotiation.
vi. Commencement of Lease	July 2015

- Detailed terms and conditions have been given in the RFP schedule. RFP notice and schedule may be viewed in Biman's web-site: www.biman-airlines.com.
- The Offers/Proposals are to be submitted latest by 1000 hours LT (0400 hrs UTC) 19 March 2015 addressed to General Manager (Corporate Planning), Biman Bangladesh Airlines Ltd., Head Office, Balaka, Dhaka, Bangladesh through E-mail at dacpm155@bdbiman.com. Proposals/offers may also be submitted through courier service or dropped in the Tender Box placed in the office of General Manager (Corporate Planning), Biman Head Office, Balaka, Kurmitola, Dhaka-1229. No offer/proposal will be accepted after the closing time and date.
- For further information or query, General Manager (Corporate Planning) may be contacted at Telephone: +880-2-8901600/Extension-2415, +880-2-8901697 (direct), Fax: +880-2-8901396, E-mail: gmp@bdbiman.com during the office hours.
- Biman Bangladesh Airlines Ltd. reserves the right to accept or reject any or all the offers/proposals partly or wholly without assigning any reason whatsoever and no claim shall be entertained in this regard.

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WORK EXPERIENCE PETER SMITH

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Peter Smith is chairman and chief executive of the UK-based Nasmyth Group, a cluster of 14 precision engineering companies that serve a range of industries including aerospace, defence and space

Tell us about your career to date

From an academic background in physics, my career began in the electronics industry, where I was able to extend my theoretical knowledge into some leading-edge areas of engineering. Then, at a relatively early stage, I moved into a general management role with a medium-sized mechanical engineering company. One of the key aspects of this role, and subsequent roles, was its global dimension, serving markets like China and Brazil, as well as Europe and North America. I also gained experience of different forms of engineering as well as a good grounding in the requirements of the aerospace sector.

In the late 1990s, I had the opportunity to lead a management buy-in for the purchase of a group of companies I was running for Marconi. That gave me experience of working with the financial sector, which helped me in 2003 when I first established the Nasmyth Group.

How is the aerospace engineering industry faring?

It's an interesting question. The sector as a whole, particularly in civil aerospace, has been going through a very strong period of business growth in terms of the end applications. The growth of the major airframe companies has been very positive and shows all the signs of being strong for the long-term future. Like any industry it has its waves of higher growth and lower growth, and I think we're probably now in a period of slightly



Smith's experience of the financial sector helped him establish the group

less growth than we were a year or two ago. I'm talking about civil aerospace here; I think the military market is entirely different and probably not really appropriate for me to comment on.

What challenges do you face as a company?

Perhaps the most interesting challenges are those of growth and development, prioritising what we invest in to provide a stronger foundation for the group and to provide the one-stop-shop solution our customers are looking for.

We also face the challenges that many other businesses face, such as the eternal difficulty of recruiting the right people.

Do you provide training programmes for your workforce?

More than 10% of our employees are currently apprentices at vari-

ous stages of their career development. But another significant percentage are on more mature programmes, taking company-sponsored degrees, for example. What's important is continually taking people beyond the point they've reached.

What are the most demanding aerospace projects you have taken on?

All of them are demanding in different ways. Some projects call for very close tolerance components, some are complex in terms of the number of items required, and some are demanding because the parts will have to withstand very high temperatures or pressures. Another example would be the machining of very complex shapes such as the fuel pipe connectors that we manufacture for various airframe

companies. Whatever the project, the key lies in finding the solution – in providing the totality of what the customer wants from our own resources or, when appropriate, using additional resources from our supply chains.

Do you plan to expand?

We certainly do plan to expand but not in terms of the number of companies. We've already brought together two or three of our businesses into a more cohesive element, which we've called Nasmyth Technologies. In terms of future investment, we have a particular focus on the very latest technologies in the mechanical and electro-mechanical aerospace sector, such as 3D machining or 3D printing of metal objects.

We also want to expand geographically, with a particular focus on North America and Asia.

What do you enjoy most about your job?

There's very little I don't enjoy! But the highlight is working with some very professional people who have lots of interesting things to offer. It's very fulfilling to see a difficult challenge overcome and converted into a solution by talented teams. ■



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